THE IRON AGE

New York, June 27, 1918

NON-GRAN

What Are Your Costs for Renewing a Worn Bearing?



THE next time you find it necessary to renew the bearings in one of your machines, use the table below for keeping a record of the cost.

The results so disclosed will amply repay you for the effort.

Tearing down Machine	$?	
Machining new Bearing	?	
Scraping and Fitting new Bearing	?	
Re-Assembling Machine	?	
Total Labor Cost	?	$?
Loss of Productive value of machine and operator while idle	?	?
"X" Cost of bearing Metal	?	?
Total Cost		?

Upon the wear-resisting ability of item "X" hangs the fate of the whole job. The instant the new bearing gives way to the grind of friction, you must again foot the "Total Cost" of another similar Renewal. Adequate wear-resisting quality therefore, and not "Price," should be your criterion in selecting bearing metal.

Following we are pleased to give a partial list of the American concerns who invest in Non-Gran Quality. They have each proved that such investment saves them hundreds of machine-hours and untold dollars annually.

American Can Company
American Ever Ready Works
American Pin Company
Bigelow-Hartford Carpet Company
Bock Bearing Company
Borden's Condensed Milk Co.
Cheney Brothers
The Crown Cork & Seal Co.
Eaton, Crane & Pike Company
Eddystone Munitions Company
Edison Electric Storage Battery Co.
Edison Lamp Works
Frost Gear & Forge Company
The Gorham Company
Greenfield Tap & Die Corporation
Hess-Bright Manufacturing Company
Hires Condensed Milk Company
International Paper Company
National Bolt & Nut Company
National Lamp Works
National Sugar Manufacturing Co.
New England Westinghouse Co.
New Haven Screw Co.
New Remington Rifle Co.
North American Button Company
Remington Arms Company
Remington Typewriter Company
Rowe Calk Co.
Royal Typewriter Co.
Solvay Process Company
Taylor Instrument Company
Tonopah Placers Company
Toledo Scale Company
Union Metallic Cartridge Company
United States Light House Service
United States Navy Department
United States Post Office Department
United States Quartermasters' Department
United States Ordnance Department
United States Signal Corps
Winchester Repeating Arms Company

American Bronze Corporation
Berwyn . Pennsylvania

NON-GRAN

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MORE KOPPERS OVENS

Contracts have recently been made with
H. KOPPERS COMPANY
for the following
by-product coke plants:

	OVENS
Jones & Laughlin Steel Company . .	300
Carnegie Steel Company	128
Fairmont By-Products Corp.	110
Providence Gas Company	40
Indiana Coke & Gas Company	30

H. KOPPERS COMPANY
PITTSBURGH, PA.

Designers, Builders, Operators of

By-Product Coke and Gas Plants
Benzol and Toluol Recovery Plants

THE IRON AGE

New York, June 27, 1918

ESTABLISHED 1855

VOL. 101: No. 26

Chemist's Part in Speeding Up Steel Output

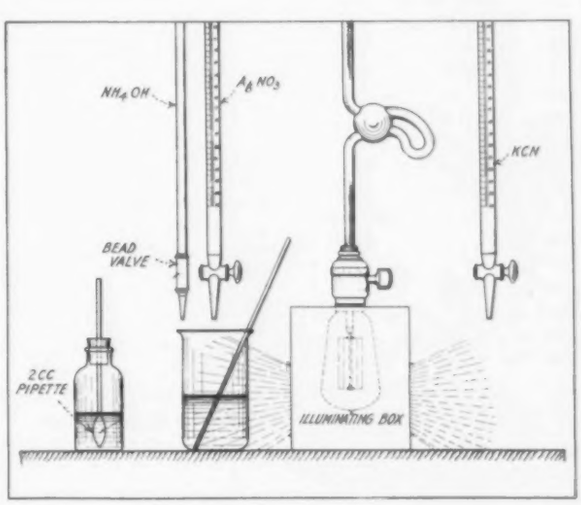
Rapid and Efficient Preliminary Analyses—Importance in Making Electric Steel—The Man Behind the Chemicals

BY A. F. MACFARLAND*

ALTHOUGH the steel works' chemical laboratory is often considered a small cog in the gigantic machinery of our steel industry, it plays a vital rôle in the production of good steel, inasmuch as it controls in a large measure the chemical composition of the metal. Winning the war necessitates maximum steel production, which can be accelerated by the chemist himself in furnishing accurate and rapid results.

It has become the very general practice in open-hearth and electric steel works to send a preliminary or bath sample to the laboratory for a rapid analysis which enables the melter to calculate the additions of alloys which are necessary to bring the steel to chemical specifications before tapping the heat. In the manufacture of high-grade alloy steels where alloy scrap is used in the charge, the work of the preliminary laboratory becomes a very important factor.

The usual method of judging the carbon content of the metal in the furnace by the appearance of a cast, quenched and fractured test piece is more or less complicated when nickel, chromium or other special elements are present. This difficulty is more pronounced when the amounts of the special elements are not known. When the charge is made up of miscellaneous scrap, the melter necessarily depends upon the preliminary chemist for a knowledge of the chemical composition of the melted steel in order to work the heat and interpret fractures intelligently.



Apparatus for Quick and Accurate Determination of Nickel in Alloy Steels

The Man Behind the Analysis

In many plants much time is unnecessarily spent in making the requisite determinations, thereby delaying the furnace and ultimately retarding production. Delaying the furnace means additional added expense in fuel or electricity, labor and material. During a recent visit to an electric steel plant a sample was sent to the chemist for the quick determination of carbon, manganese, nickel and chromium. One hour and twenty-five minutes elapsed from the time the sample left the furnace to the time the results were returned. Forty minutes were wasted because, with the proper arrangement, one man can make these determinations in from 22 to 30 minutes, depending, naturally, upon the caliber of the man in the laboratory. If it were possible to cut down the melting time of each heat by 40 minutes, what a large saving might be accomplished in a few months with a resulting increase in production.

It is false economy to place a "rule of thumb" man in the preliminary laboratory. He should have sound technical training, actual analytical experience and should be sufficiently ingenious to work out simple devices which facilitate accuracy and speed. The chemist analyzing preliminary samples has considerable responsibility, because a slight error on his part may easily result in an "off analysis" heat. The melter and the preliminary chemist should co-operate very closely, as the production of good steel depends upon their efforts.

Arrangement of the Laboratory

A suitable laboratory arrangement is of primary importance in making rapid determinations. When speed is desired, every wasted movement, such as a step across the room for a pencil which should be in one's pocket, or filling a burette which should be already filled, cuts down the efficiency.

The plan shown in one of the illustrations has worked out very satisfactorily in a small electric-furnace steel plant where preliminary determinations of carbon, manganese, sulphur, phosphorus, nickel and chromium were made. However, the arrangement must be modified to suit the class of work and the number of men working in the laboratory. It will be noted that the fume hood, carbon train, filtering sink and titration table are

*Metallurgist, United States Ball Bearing Co., Chicago.

all grouped as closely together as possible. After weighing the samples of the work all is done in the minimum floor space, thereby eliminating all unnecessary steps.

Some years of actual experience in this line of work has shown the following time limits quite practical for rapid determinations without impairing the accuracy of the results obtained. One man performs the analysis and his time is counted from the moment he receives the drilled sample to the time the written report is ready.

	Minutes
Carbon	10 to 13
Carbon and manganese	12 to 14
Carbon, manganese and nickel	14 to 18
Carbon, manganese, nickel and chromium	22 to 28
Carbon, manganese and sulphur	15 to 19
Carbon, manganese, suphur, phosphorus (estimated)	18 to 24
Carbon, manganese, sulphur, phosphorus, nickel and chromium	35 to 40

If other than preliminary tests are analyzed in the laboratory, as is usually the case with small steel plants, the chemist should be notified 10 or 15 minutes before the preliminary sample is furnished, to enable him to make the requisite preparations. These preparations are of utmost importance from a speed standpoint, and will be brought out in the following outlines.

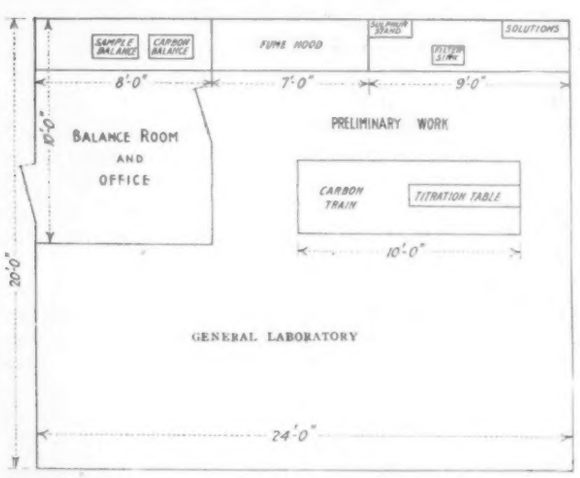
The apparatus preparations, solution and procedure in the case of the various elements are as follows:

Carbon

Apparatus:—The carbon train, oxygen tank, reducing valve set at about 7 lb. pressure, mercury pressure gage, jar containing soda lime and calcium chloride, electric tube furnace at a temperature of 1000 to 1100 deg. C. with Johnson's clay combustion tube packed 6 in. from outlet with ignited asbestos, zinc jar, phosphoric anhydride jar, and absorption bulb.

Preparations:—An absorption bulb should be weighed and attached to the end of the train, ready for service; a combustion boat should be prepared to receive the drillings and the carbon balance should have the counterbalance and approximately the correct weights on the pan.

Procedure:—Weigh a 2 gram sample of the drillings and ½ gram of red lead, and transfer, after being well mixed on a 2-in. watch glass, to a trough made in ignited silica sand contained in a clay combustion boat. The drillings should be spread evenly in the boat. Introduce the boat containing the sample into the combustion tube, placing it in approximately the center of the furnace. Make a tight connection at the inlet end of the tube and turn on a fairly rapid stream of oxygen. In a few seconds the steel begins to burn and the flow of gas is increased sufficiently to maintain the pressure previously registered by the mercury gage. After burning, which is usually completed in one and one-half minutes, decrease the rate of flow of oxygen and allow the apparatus to sweep out for 7 min. A stop watch can be used to advantage in this determination. At this point detach the absorption bulb and weigh. Determine the percentage of carbon from a calculated table.



Plan of a Laboratory for Quick Determinations of Preliminary Tests of Alloy Steels

Manganese

Solutions:—Silver nitrate and nitric acid solution:

Silver nitrate	2 grams
Nitric acid	500 cu. cm.
Distilled water	2000 cu. cm.

Ammonium persulphate solution—20 per cent.

Standard sodium arsenite solution: 1 c.c. should equal 0.10 per cent Mn on a 0.2 gram sample. The standard solution may be prepared by diluting 100 c.c. of a stock solution of sodium arsenite to one liter with water. This stock solution is made by dissolving six grams of arsenious acid and 25 grams of sodium carbonate in one liter of water. Standardize the solution for titrating with a steel of known manganese content.

Preparations:—The solvent in a flask should be placed beside the balance; the measured amount of persulphate solution should be contained in a graduate and placed near a lighted burner; a burette should be filled with sodium arsenate solution and set at zero.

Procedure:—Weigh carefully a 0.20 gram sample and dissolve in 30 c.c. of silver nitrate and nitric acid solution contained in a 200 c.c. Erlenmeyer flask, over a Bunsen burner. After complete solution is effected, add, while boiling, 10 c.c. of the ammonium persulphate solution. Allow the color to develop and remove from the flame. Cool in running water and titrate with standard sodium arsenite solution to a pale greenish color. (The end point for chromium steels is yellow.)

Nickel

Apparatus:—A 40-watt lamp is placed in a box with apertures in the sides, permitting the rays of light to pass through the solution in the beaker. It is possible in this manner to detect the slight turbulence which is manifest in the solution at the end point of the titration. The set up as shown in one of the illustrations, eliminated the difficulties of titrating nickel determinations on the night shift. In fact, the end point was made so much sharper than previously that the light was never extinguished in the day. By the use of this arrangement a marked improvement was obtained in the accuracy of the results.

Solutions:—Hydrochloric acid, sp. gr. 1.10; nitric acid, sp. gr. 1.20; ammonia, equal parts of concentrated ammonia and water; ammonia, concentrated; citric and sulphuric acid solution, 470 grams citric acid, 200 c.c. sulphuric acid concentrated, 1400 c.c. distilled water.

Potassium iodide solution, 20 per cent; standard silver nitrate solution, 1 c.c. equivalent to 0.10 per cent nickel, 5.85 grams of silver nitrate dissolved in one liter of distilled water, and standard potassium cyanide solution, 1 c.c. equivalent to 0.1 per cent nickel, 4.9 grams potassium cyanide and 5 grams of potassium hydroxide dissolved in one liter of distilled water.

Preparations:—A 400 c.c. tall beaker containing 10 c.c. of hydrochloric acid should be placed near the sample balance, nitric acid for oxidizing should be near a lighted Bunsen burner, measured amounts of citric and sulphuric acid solution and concentrated ammonia should be placed near the cooling sink, and burettes should be filled with standard solutions and set at zero, ready for titrating.

Procedure:—Treat one gram of the drillings to be analyzed with 10 c.c. hydrochloric acid in a 400 c.c. tall form beaker. Cover with a watch glass and place the beaker and its contents over a lighted Bunsen burner. When the drillings are nearly dissolved, oxidize by adding about 6 c.c. nitric acid. Concentrate the solution to a volume of 8 or 10 c.c. and remove from the flame. Add 75 c.c. of the citric and sulphuric acid solution down the sides of the beaker to wash down any of the solution that may be on the sides, and add, carefully, 40 c.c. of concentrated ammonia. Cool the

solution by placing the beaker in a stream of running water. The solution is now ready to titrate.

Run in about 2 c.c. of standard silver nitrate solution. Silver chloride is precipitated. Add, drop by drop, diluted ammonia until the precipitate is just dissolved. Silver chloride is soluble in ammonia while silver iodide is very slightly soluble. Now add 2 c.c. of potassium iodide solution. Silver iodide is precipitated. Run in standard potassium cyanide solution until the precipitate has entirely disappeared and titrate back with standard silver nitrate solution until a very slight turbulence is noted. The total number of c.c. of potassium cyanide solution used divided by ten gives the percentage of nickel.

Chromium

Preparations:—A 600 c.c. tall form beaker containing 30 c.c. of sulphuric acid and 20 c.c. of water should be placed near the balance; 60 c.c. of nitric acid should be contained in a graduate and placed near a lighted Bunsen burner; potassium permanganate solution for oxidizing should be near the burner; a fine alundum cone filter should be fitted to a 500 c.c. suction flask containing 30 c.c. of sulphuric acid and attached to a filter pump.

Solutions:—Sulphuric acid, one part of concentrated acid diluted with three parts of water; nitric acid, sp. gr. 1.20; potassium permanganate, 15 grams potassium permanganate dissolved in one liter of water. Standard ferrous sulphate solution, tenth normal: 40 grams of ferrous ammonium sulphate and 100 c.c. of concentrated sulphuric acid diluted to one liter with distilled water; standard potassium permanganate solution, tenth normal: 3.16 grams of potassium permangante dissolved in one liter of distilled water. Standardize against pure sodium oxalate.

Procedure:—Dissolve a two gram sample in a 600 c.c. tall form beaker with 30 c.c. of sulphuric acid and 20 c.c. of water. When nearly in solution, oxidize with 60 c.c. of nitric acid and boil to expel reducing gases. Add potassium permanganate solution a little at a time until the solution turns a permanent red and a precipitate of manganese dioxide forms. Boil vigorously for five minutes if necessary to destroy the excess of permanganate. Filter the hot solution through an alundum cone filter into a 500 c.c. suction flask containing 30 c.c. of sulphuric acid. Cool in running water and add a measured excess of standard ferrous sulphate solution until the green color no longer grows deeper. Titrate back to a faint pink with standard potassium permanganate solution. The number of c.c.'s of potassium permanganate solution subtracted from the number of c.c.'s of ferrous sulphate solution used multiplied by the factor 0.087 gives the percentage of chromium in the steel. It is necessary to deduct a certain percentage which is predetermined by running a chromium free steel. This blank usually amounts to about 0.04 or 0.05 per cent.

Notes: For sharp end points it is necessary to make the solution as cold as possible before titrating.

All of the potassium permanganate must be converted by boiling to manganese dioxide before filtering.

Phosphorus

Solutions:—Nitric acid, 1 to 1; potassium permanganate, 15 grams to liter; sodium nitrite, 10 per cent solution; ammonium hydroxide, concentrated; ammonium molybdate solution: Dissolve 115 grams molybdic oxide, 85 per cent, in 200 c.c. water and 175 c.c. concentrated ammonia, mixing the water and Mo03 before adding the ammonia. Dilute in separate vessel, 575 c.c. nitric acid with 1500 c.c. water. Add the ammonium molybdate solution, a little at a time with frequent shaking, to the diluted nitric acid. Shake well and allow to stand 24 hr. before using; sodium nitrate, 2 per cent solution for wash water; standard sodium hydroxide solution: 1 c.c. = 0.01 per cent P.; standard sulphuric acid solution: 1 c.c. = 0.01 per cent P. Standardize last two solutions with a steel of known phosphorus content.

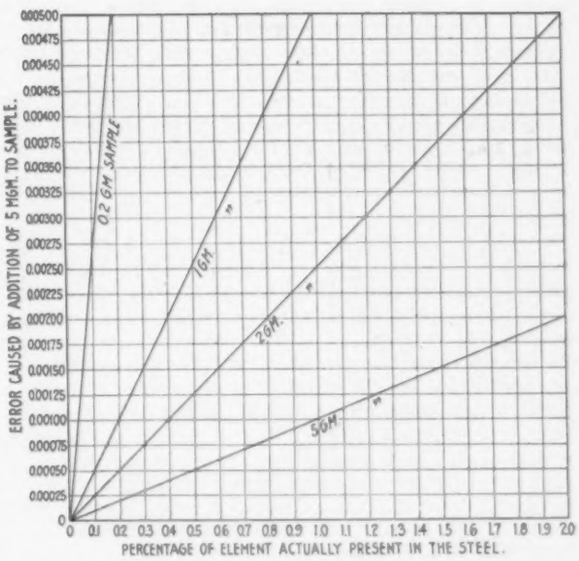


Diagram Showing Errors Caused in Analyses by the Addition of 5 Milligrams of Steel in Weighing Samples

Preparations:—A 500 c.c. Erlenmeyer flask containing 40 c.c. of nitric acid and 40 c.c. of water should be placed near the balance. It is best to weigh this determination last on account of the fumes evolved; a lighted Bunsen burner should be ready for service; permanganate and sodium nitrite solutions should be placed near the burner; the proper amounts of ammonium molybdate and ammonia solutions should be contained in graduates on the filtration table; a pulp filter should be ready for use; burettes should be filled and set at zero.

Procedure:—Dissolve 2 grams of the drillings contained in a 500 c.c. Erlenmeyer flask with 40 c.c. nitric acid (1-1) and 40 c.c. water. Boil and add potassium permanganate solution till a permanent precipitate of manganese dioxide forms (about 5-10 c.c.). Boil to oxidize. Reduce the excess MnO_2 with sodium nitrite solution. Remove from hot plate and carefully add 10 c.c. concentrated ammonia. Swirl flask to dissolve precipitate. Add 50 c.c. clear ammonium molybdate solution, stopper flask and shake vigorously. If time is limited "estimate" phosphorus at this point. Allow to stand a sufficient time for the yellow precipitate to settle out. Filter on paper pulp, washing precipitate into filter from flask with sodium nitrate wash water. Place filter and contents in original flask with 30 c.c. water and 10 c.c. standard sodium hydroxide solution (when phosphorous is below 0.45 per cent) to dissolve the yellow precipitate. Shake to dissolve, let stand a minute, add phenolphthalian indicator and titrate back to colorless with standard sulphuric acid. Number of c.c. acid, deducted from number of c.c. alkali, divided by 200 gives percentage of phosphorous.

Sulphur

Solutions:—Cadmium ammonium chloride and starch solution:

Cadmium chloride	5 gms
Ammonium hydroxide, concentrated	100 c.c.
Starch solution	40 c.c.
Distilled water	1900 c.c.

Starch solution: Ten grams of starch are made into a thin cream with water. Add 600-700 c.c. boiling water to the starch. Ten grams of potassium hydroxide are dissolved in water and added to the solution of starch. Heat to boiling and dilute to one liter; hydrochloric acid, one part of concentrated acid to one part of distilled water; standard iodine solution, one cubic centimeter should be equivalent to 0.01 per cent sulphur. Dissolve four grams of iodine and 16 grams of potassium iodide in distilled water and dilute to one liter. Standardize with steel of known sulphur content.

Preparations:—A dry 500 c.c. Erlenmeyer flask

should be placed near the balance; 100 c.c. of cadmium chroride solution and 50 c.c. of water should be contained in a 400 c.c. tall beaker with delivery tube; 75 c.c. of hydrochloric acid should be contained in the cylindrical separatory funnel which is clamped in the sulphur stand ready for use; a graduate containing 50 c.c. of hydrochloric acid should be placed near a burette which is filled with standard iodine solution and set at zero; a lighted Bunsen burner should be ready for service.

Procedure:—Weigh 5 grams of the drillings and transfer to a dry 500 c.c. Erlenmeyer flask. Fit a two hole No. 6 rubber stopper with a delivery tube and a 75 c.c. cylindrical separatory funnel into the flask, having the delivery tube touch the bottom of a 400 c.c beaker, tall form, containing 100 c.c. cadium ammonium chloride and starch solution and 50 c.c. water. Run 75 c.c. hydrochloric acid contained in the separatory funnel into the flask. Close stop-cock and apply gentle heat. Heat gently until all drillings are in solution, then boil vigorously for a few minutes to sweep out last traces of H_2S. Remove beaker, which should be cool, add 50 c.c. hydrochloric acid and titrate immediately to a distinct blue with standard iodine solution.

After some experience the chemist will learn to systematize his work in a manner which will give the most accurate results in the least time. The ability to keep a number of determinations all going at once with no loss of time indicates a speedy and ingenious worker. The following scheme has proved efficient in determining carbon, manganese, nickel and chromium on a preliminary sample, although it may be necessary to somewhat modify these steps to suit different laboratories and chemists:

Nickel-Chromium Preliminary:—Weigh samples; place nickel, chromium and manganese determinations over burners; burn carbon; oxidize manganese, chromium and nickel; cool manganese; add citric, sulphuric solution and ammonia to nickel determination and cool; add potassium permanganate to chromium determination; titrate manganese and nickel; filter chromium; cool chromium and weigh carbon; titrate chromium and report.

Weighing

Much valuable time is often wasted in weighing samples. Many chemists fail to consider what effect a slight error in weighing a sample will have on the results obtained. It must be remembered that relatively small amounts of the elements to be determined are present in steel. Drillings may be rapidly weighed to within 5 milligrams of the desired weight, which is in most cases sufficiently accurate for preliminary work. Suppose, for example, a steel contains 0.50 per cent carbon. The sample for combustion weighs 2.005 grams instead of 2 grams. The percentage of carbon which would be obtained, allowing for no experimental error, is 0.50125. In other words, the error caused by an addition of 5 milligrams of steel to a 2-gram sample of 0.50 per cent carbon steel will amount to an addition of 0.00125 per cent carbon to the result. As the percentage of the element being determined decreases, the error will naturally decrease, and conversely. The error which will show in the results caused by an addition of 5 milligrams of steel to samples of different weights is shown in the diagram.

The object in outlining these well-known methods has not been to lay down hard and fast rules which must be strictly adhered to. It has been, rather, to illustrate by actual outlined procedure how practical and possible it is to perform rapid analyses efficiently.

Equipment for Reclaiming Core Sand

For effecting savings in the amount of core sand required for foundries as well as in the quantity of binder used, freight charges, time and labor, the W. W. Sly Mfg. Co., Cleveland, is offering equipment for two different methods of reclaiming core sand. The object in both cases is the same, the separation of the burnt sand and dust from the core sand, thus enabling the reclaimed material with the addition of a small percentage of new sand and binding material to be used again. One method is pursued in connection with light cores, such as are used in radiator columns and similar work, while the other is intended for the heavier cores employed in connection with automobile castings.

It is pointed out that the first class of cores cannot be taken out of the castings whole, but by tumbling the castings in exhaust type tumbling barrels the core sand can be cheaply and quickly removed. In foundries doing this class of work a separator is installed on the dust main to collect the good core sand, while the dust and burnt sand pass on into the dust arrester. Where this form of reclaiming apparatus is used the exhaust fan must have sufficient pressure to lift the heavy sand into the separator, and as the velocity in this case is greater than usual, it is pointed out that faster cleaning of the work, which, of course, is an advantage, is possible.

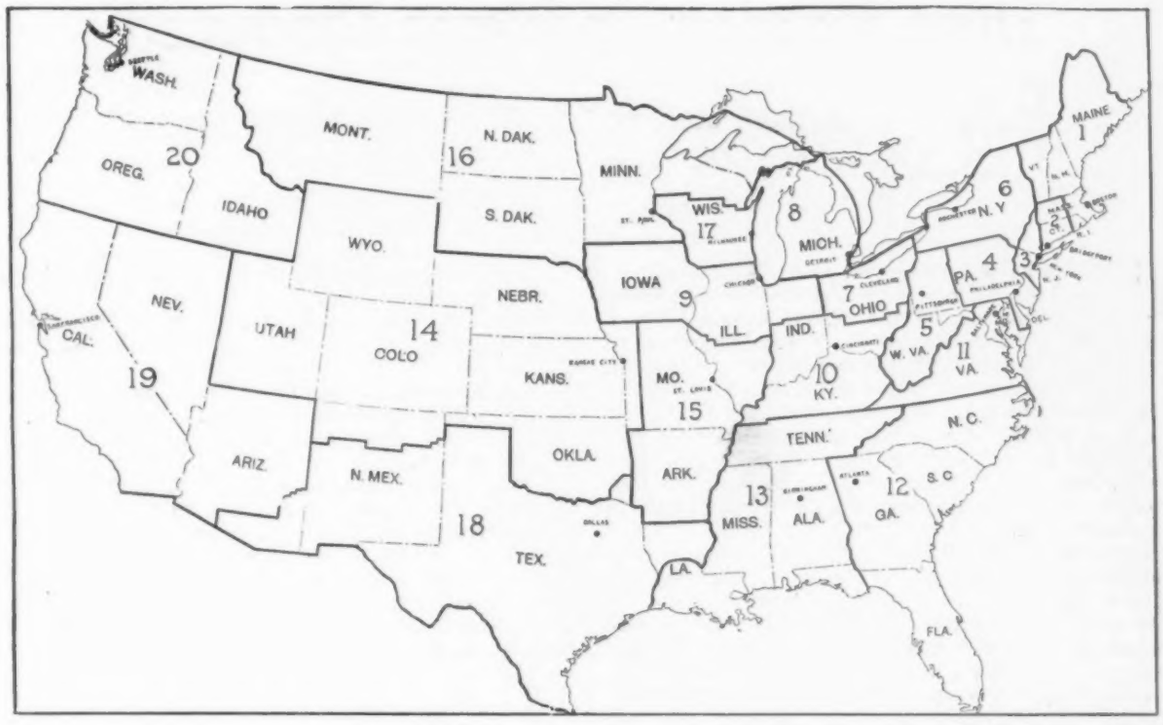
The heavier cores, it is explained, are generally shaken out and are not broken to any great extent. These are fed by hand or some mechanical device through a large hollow trunnion of the core crushing mill, and a light crusher on the inside of the barrel grinds the cores. The fine material falls through the perforations of the mill shell and in turn through an automatic wire screen riddle into a hopper underneath. This equipment, it is pointed out, answers the double purpose of crushing the material and separating all the nails, wire and other foreign material from the sand. The fine material is conveyed by suction from the hopper underneath the mill into a separator, as was the case with the lighter cores.

Practices in Export Business Dealings

The W. J. Crouch Co., Inc., exporter of steel and steel products, 68 William Street, New York, recently received an informing letter from Thomas D. Davis (Oklahoma), United States consul at Grenoble, France. Among other things, he wrote:

"While I have great admiration for the resourcefulness and courage of our American merchants, I must, in the interest of truth, say that the English are going at the matter much more successfully in this consular district than our own exporters. They have the advantage of being nearer, of having certain tariff favors, but their success principally lies in their disposition to treat with the Frenchman in the French way. The English merchant uses the metric system in quoting prices, his prices are given in francs at the railway station of the purchaser. In addition to this, business relations of a lasting and intimate nature are sought to be established, credit facilities are afforded, and mutual trust and confidence are usually built up. Some of our American business men have treated old-established and perfectly solid firms of this district very brusquely in the matter of carrying out the formality of payment, although these firms asked no better than to pay cash for their goods."

Employers engaged in war work were urged in a statement by President Wilson June 17, to refrain, after Aug. 1, from recruiting unskilled labor in any manner except through the United States Employment Service recently organized by the Department of Labor. The statement was accompanied by a letter written June 15 by Secretary of Labor Wilson calling attention to the forming of the Employment Service. The labor forces were called upon by the President "to respond loyally as heretofore to any calls issued by this agency for voluntary enlistment in essential industry."



TO READJUST INDUSTRY

Twenty Regional Organizations to Help Put All Plants on War Work

For the purpose of developing new industrial resources to meet the war demands of the Government, and quickly to disclose additional means of increasing production, the War Industries Board has established a Resources and Conversion Section. Charles A. Otis, Cleveland, former president of the Cleveland Chamber of Commerce and a member of the board of directors of the Chamber of Commerce of the United States, has been appointed chief of this section, as noted a few weeks ago in these columns.

To carry out the plans, it has been decided to divide the country into 20 regional groups and to organize each region through the commercial organizations within the region. The purpose of this regional system is immediately to make a careful survey of every section of the country to determine what industries not now doing war work may be utilized for such work, and also to ascertain what industries already engaged on work for the Government are able to take on additional contracts or increase their production of munitions and war supplies. The twenty regions determined on are shown by the accompanying map.

The regional organization is intended to supplement the work of the national war service committees of the industries. Many industries are not so organized as to permit representation by a national war service committee, and in the development of the regional organization it is proposed to look after the requirements of these scattered industries and to provide a means by which greater impetus can be given to increasing production in every section of the country.

The advantage looked for in this is the preventing of further dislocation of labor, and the minimizing of new housing problems, unnecessary expansion of plants and freight congestion and also the providing of work for industries whose normal output already is being reduced without the possibility of their resources being employed in new directions.

Some of the appointments as regional director were noted in last week's issue. As local business association groups meet to choose their heads, announcements will be made. Meanwhile the American Society of Mechanical Engineers has entered the movement as noted below.

Bridgeport Regional Industrial Commission

The second or Bridgeport regional organization, under the recently organized Resources and Conversion Section of the War Industries Board, has held its first meeting under the auspices of the Bridgeport Chamber of Commerce which was selected to initiate the movement. The members voted to recommend to the War Industries Board the name of Bradford D. Pierce, Jr., president Bridgeport Chamber of Commerce, as general chairman of the commission and C. E. Bilton and Walter B. Lashar as alternates. Six sub-districts have been selected to cover the work in the Bridgeport region which includes Connecticut and Western Massachusetts. The chairmen named for these sub-districts are:

Bridgeport, including Fairfield and Litchfield counties, C. E. Bilton, president Bridgeport Manufacturers' Association

New Haven, including New Haven and Middlesex counties, Isaac M. Ullman, president New Haven Chamber of Commerce.

Hartford, including Hartford and Tolland counties, Charles L. Taylor, chairman Manufacturers' Committee, Connecticut Manufacturers' Association.

New London, including New London and Windham counties, C. C. Peck, president New London Chamber of Commerce.

Springfield, including Hampden, Hampshire and Franklin counties, William H. Stuart, president Springfield Chamber of Commerce.

Pittsfield, including Berkshire County, Allen H. Bagg, president Pittsfield Board of Trade.

Lower Michigan Peninsula

Organization of the entire lower peninsula of Michigan for general work under the direction of the War Industries Board has been perfected by A. A. Templeton, regional director. M. J. Murphy, president of the Murphy Chair Co., Detroit, will have charge of division 1, constituting Wayne, Monroe and Oakland counties; Chas. W. Haensel, Port Huron, will have charge of division 2; G. T. Kirby, Saginaw, division 3; D. A. Reid, Flint, division 4; L. C. Howlett, Bay City, division 5; W. M. Comstock, Alpena, division 6; A. B. Kleise, Petoskey, division 7; E. N. Turner, Manistee, division 7; J. E. A. Johnson, Muskegon, division 9; Dudley E. Waters, Grand Rapids, division 10; Clarence E. Bement, Lansing, division 11; C. F. Holland, Jackson, division 12;

(*Continued on page* 1679)

Drop Forging Problems Discussed

Association Meeting Last Week—Powdered Coal and Oil Fuel, Quenching, Welfare Work and Electric Furnace Heat Treating

THE fifth annual convention of the American Drop Forge Association was held at the Iroquois Hotel, Buffalo, June 19, 20 and 21. In connection with this meeting the Drop Forge Supply Association held its third annual session. The attendance was about 200, or nearly the same as at the annual meeting held in Cleveland a year ago. This was gratifying to those in charge as it had been expected that war-time conditions might have the effect of reducing the attendance. As it was, important Government work prevented the attendance of several members who have been active in the organization.

R. T. Herdegen, Dominion Forge & Stamping Co., Walkerville, Ont., president of the association, said that in laying out the program for the meeting, they had tried to bring out matters that would show how a man can get the highest possible efficiency out of his raw material. He referred to a new form of investigation that has been taken up by the fuel administrator in Canada, who is investigating plants to see if coal and oil are being burned efficiently. Plants that are wasting their fuel will probably have their supply cut down unless they make needed changes. The report of E. B. Horne, Packard Motor Car Co., secretary and treasurer, showed that the present membership represents about 80 per cent of all the forging hammers in the United States. His report also showed a balance of $1,369.10 in the treasury.

Force to the Uttermost

The spirit of the members of the two organizations and their attitude in respect to carrying on the war until final complete victory is won was indicated by the passing of the following resolution by both organizations:

"That the delegates of the American Drop Forge Association and Drop Forge Supply Association, assembled in joint convention in Buffalo, June 21, 1918, desire to record publicly their unanimous indorsement of the policy of "force to the uttermost," announced by the President of the United States, and we hereby pledge our organizations, our energies, thoughts and efforts as our share in carrying out this policy to final success, no matter what sacrifices be involved; that no peace be concluded with the enemies of our country without victory to our arms and those of our Allies."

New Officers

Owing to the increase in the organization's work handled by the secretary-treasurer, it was decided to separate these two offices and have a salaried secretary. New officers were elected for the ensuing year as follows:

President, E. J. Frost, Frost Gear & Forge Co., Jackson, Mich.

Vice-president, J. F. Connelly, Champion Forge & Machine Co., Cleveland.

Treasurer, E. B. Horne, Packard Motor Car Co., Detroit.

Secretary, A. W. Peterson, American Drop Forger, Pittsburgh.

Directors, R. T. Herdegen, Dominion Forge & Stamping Co., Walkerville, Ont.; F. A. Ingalls, Ingalls-Shepard Forge Co., Chicago; H. D. Stoddard, Wyman & Gordon Co., Worcester, Mass.; Edgar E. Adams, Cleveland Hardware Co., Cleveland; F. W. Trabold, J. H. Williams & Co., Brooklyn, N. Y.

The Drop Forge Supply Association reelected its officers as follows:

President, H. N. Taylor, N. & G. Taylor Co., Philadelphia.

Vice-president, Charles Harmon, Jr., National Machinery Co., Tiffin, Ohio.

Secretary-treasurer, A. W. Wurster, Philadelphia representative Heppenstall Forge & Knife Co., Pittsburgh.

Executive committee, Homer D. Heman, Ajax Mfg. Co., Cleveland, reelected; and C. W. Heppenstall, treasurer and general manager Heppenstall Forge & Knife Co., Pittsburgh.

Guy Hagar, Lackawanna Steel Co., Buffalo, George I. Allen, Heppenstall Forge & Knife Co., and J. M. Schlendorf, Central Steel Co., were reappointed members of the entertainment committee, and other local members will be added to this committee when the place of holding the next annual meeting is decided upon. The present membership committee, of which Jules Dierckx, Keller Mechanical Engraving Co., Brooklyn, N. Y., is chairman, was reappointed.

Powdered Coal

The technical sessions were held Thursday afternoon, Friday morning and afternoon. The program included a number of interesting papers and talks on various practical topics associated with the drop forge industry, many of these being illustrated with lantern slides. The first paper presented was on "Powdered Fuel for Drop Forge Furnaces," by H. D. Savage, vice-president Locomotive Pulverized Fuel Co., New York. He said that probably the greatest benefits that our country will derive from the war will be from the lessons of economy the necessities of war have forced upon our manufacturers. There is no industry whose members as a whole are more important to the vast activities of the war than the members of the Drop Forge Association. With coal at $90 per ton in Italy and $60 per ton in France and with England unable to give more than slight assistance in supplying the necessary demands of the warring world for this commodity, with fuel oil on the verge of practical confiscation for the use of armies and navies, it is the duty of everybody to do his bit in conserving this natural resource. Toward this end he said it was well to consider that under normal conditions coal when pulverized and burned in suspension produces heat at a much less cost than with any other known method of combustion other than natural gas, that with the great advance in the price of oil the ratio of saving is much greater in favor of coal, that the combustion of powdered fuel is as easily controlled as oil or natural gas, and that in metallurgical work its advantages over either are numerous.

The highly developed mechanically correct feeders and burners which have been thoroughly proved in actual practice must not be confused, he said, with the immaturely developed apparatus of the past, the premature exploitation of which has caused much of the present skepticism as to the economy and efficiency of powdered coal. However, the installation of powdered coal in any plant calls for engineering specialization, each separate installation being a distinctive engineering problem. Powdered coal as now commercially developed, he said, is a thoroughly practical, reliable and economical fuel for forge work. It is not practical for all existing plants but for those to which it is applicable it will produce a fuel economy of 30 to 60 per cent over oil or coal burned by other methods, will increase production and greatly minimize the human element in the regulation of combustion.

Mr. Savage said that his company had installed a powdered coal plant in the shop of the Sizer Forge Co., Buffalo, and had made installations in two other forge shops. His company had placed no installation in small

shops, and he did not think that the use of powdered coal had been worked out very successfully in small shops because of the large expense involved in the installation. He said that if coal is properly powdered and the equipment is properly installed very little noncombustible material would be deposited on the work or on the furnace floor. This would be in the form of dust that would be carried away without causing trouble, and slag which would form a slight scale. One great advantage of powdered coal, he said, was that any kind of coal can be used that can be procured. Coal of any quality could be burned more efficiently when pulverized than when not pulverized.

Mr. Savage stated that the American Locomotive Co. is now using powdered coal furnaces at its Schenectady plant and is equipping its whole forge shop with powdered coal furnaces. These furnaces are being provided with stacks and forced draft to exhaust the ashes. Dust that formerly escaped into the shop is now kept in the furnaces and carried up the stacks.

A representative of the Timken-Detroit Axle Co. referred to a powdered coal burning furnace that was installed in his company's plant, but he said that it was taken out before it was given a fair trial because the workmen objected to it. G. S. Atkins, Scranton Forge Co., said that his company is now burning powdered coal, and it has so far proved very satisfactory with the exception of improper feed from the collector to the main pipe due to improper installation. This he expected to remedy. Mr. Savage declared that with the proper installation no combustible elements should escape from a powdered coal burning furnace into a forge shop.

Cost Figuring of Drop Forge Dies

"Cost Figuring of Drop Forge Dies" was the subject of a paper by S. A. Keller, Keller Mechanical Engraving Co., Brooklyn, N. Y. Mr. Keller said that operation costs were kept in other departments, but not in die departments, manufacturers generally showing an indifference to die costs. In his opinion every job should bear the burden of its die costs. The scarcity and high cost of die sinkers was another subject that should be given consideration. Machine work should be used on dies wherever possible. An account should be kept of the cost of templets, drawings, etc., independent of the die sinking. Careful record should be kept of machine operations. Various operations should be separately itemized in making estimates so that no operation is overlooked. More definite detailed instruction should be given whether work is done in the shop or outside of the shop. With the increased turnover of labor, men are not guided so much by shop traditions as in normal times, and it is important that this information be furnished the die sinkers. He exhibited forms used by his company, and recommended the use of forms for each set of dies and containing every possible bit of information.

President Herdegen said that it is the practice in his shop to give blueprints and detailed information to die sinkers, and this saves the company a great deal of time and money.

Welfare Work of Cleveland Hardware Co.

One of the most interesting numbers on the program was the talk on "Welfare Work in Forge Shops" by Edgar E. Adams, Cleveland Hardware Co., Cleveland. This was largely the story of the welfare work conducted in that company's plant under his direction, and was filled with human interest. He said that the welfare movement is simply one of conservation, and this connection referred to the work taken up by the Government in building over men called to the colors and found to have physical defects. Mr. Adams described entertainingly the various welfare activities in his company's shops which employ a large percentage of foreign-born labor, and which for years have used women employees for press work, and told how the company did not confine its welfare efforts inside the plant but went into workmen's homes, investigating and remedying conditions. Much of the welfare work carried on by this company has been described in articles that have appeared in THE IRON AGE.

Mr. Adams spoke of the development of his company's present facilities including dining rooms and lunch counters for feeding employees. This work started with a lunch counter that served only hot coffee. Lunch wagons are now taken through the forge shops, and the men eat between heats as there is no shutdown. The dinner pail has practically disappeared. Some workmen bring lunches in their pockets and supplement these with purchases from the lunch counters. The company has always sold a cup of coffee for 1c. and has made a profit on it at that price. He spoke of a foremen's table in the dining room, and said that in his mind this was one of the important things in a forge shop, as it brought foremen together in personal contact. He told of the company's plan of making workmen-stockholders of selected employees, usually men who had grown up with the company, and a certain amount of stock was set aside and sold to these men. He believed that it was a good plan to advertise one's plant, and not take it for granted that your employees know all about it. "If you think you have a good shop, you should put it down in print, and then if you do not make good on what you claim, the men will call you to account for what you have said."

He spoke of the advantages of a library in a shop, and said that it had long been the rule of his company that no trade paper should be destroyed. The social features of the plant were worth looking after, he said, in order to offset the saloon, which is often the workmen's club. The dining room not only serves for dining purposes, but makes a good utility room. He believed in noonday meetings, and said the company has four pianos, a Victrola and organ to entertain the working people during the noonday hour, and prominent speakers are engaged to talk to the employees. Former employees and wives of present employees come to the plant to do Red Cross work, and among the various other social activities is an annual party for the children of employees. One of the best things his company did, he said, was to provide a special room with shower baths and lockers for the foremen.

A record of home conditions of employees is very important in Mr. Adams's opinion. Within two weeks after a man is hired the company tries to find these conditions by a friendly visit by the visiting nurse. The company's stores carry a stock of $17,000 and save the men from 10 to 50 per cent. Goods are sold at a profit, and the proceeds are used for the benefit of the employees. Mr. Adams showed pictures of a number of flower gardens in various corners surrounding the company's plants, and said that they found it cost no more to maintain these gardens than it had to remove the refuse formerly thrown on the same spots by the workmen.

Selling Forgings Through Brokers

T. W. Siemon, vice-president Union Switch & Signal Co., read a short paper entitled "Should Forgings be Sold Direct or Through Brokers?" He expressed opposition to the sale of forgings by brokers, and said that now in particular it is necessary for the manufacturers and consumers to get together. Manufacturers should know the requirements of their customers to succeed. If they sell through brokers they have little opportunity to get first-hand knowledge. The broker's only interest is to get his commission. The broker has no financial interests in the company he represents, is not familiar with plant conditions, and has little knowledge of costs. If a company sells its entire product through brokers, it takes great chances. He said there might be a limited opportunity for use of brokers in selling standard steel products, but not in the case of work done from blueprints and specifications. He believed that it was cheaper to employ salesmen. Mr. Siemon announced that the object of presenting his paper was to start something, but in this he was apparently disappointed, as no discussion developed.

The electrical system in the forge shop of the Champion Machine & Forging Co., Cleveland, was described by Edward McIlvried of that company. He

said that a magnet is used for handling all steel except bundled material.

A paper on "Steels for Gears" by G. A. Richardson, Midvale Steel & Ordnance Co., is printed elsewhere in this issue.

Determining Oil Consumption for Forge Fires

"Fuel Analysis of the Drop Forge Plant" was the subject of an interesting paper by B. K. Read, engineer Dominion Forge & Stamping Co., Walkerville, Ont., presented at the opening of the Friday morning session. In connection with his paper Mr. Read distributed a pamphlet showing the layout of his shop and the results of various tests on the furnaces, boiler room reports, distribution of steam to all producing units, etc. A summary of his paper is as follows:

Many companies especially those maintaining central stations are obtaining the most possible heat from coal, but the vast majority of manufacturers have still to improve their methods for economical burning. In the past the investment charges necessary to improve coal-burning conditions would have been so much that it was cheaper to continue to burn coal uneconomically. However, today almost any large investment will pay, as the price of fuel has increased so rapidly. The scarcity of coal and oil is also demanding the economical use of these fuels and the scarcity of labor necessitates the installing of apparatus to handle and burn fuel efficiently. The statement regarding the saving of coal also applies to forge furnaces which must be made to burn less oil. Means must be provided to heat more steel with less oil. His company under his supervision attacked this problem in a methodical way during tne year and obtained results in reducing fuel costs per pound of steel.

The company has an oil storage capacity of 120,000 gal., approximately a month's supply in seven storage tanks. The oil house is connected with the steam drop hammer shop by a concrete tunnel in which are located the steam and oil lines. A duplicate system of motor-driven circulating oil pumps is located in the steam hammer house, distributing the oil around the building in the steam pipe tunnel, then to the board hammer shop, and then overflowing back to the oil house. A pressure of about 20 to 30 lb. is maintained. From this circulating oil line risers are taken up to the various furnaces. A natural gas line parallels the oil system so that either fuel may be used. Supplementing the main oil system is a test oil line. A 300-gal. test tank is located in the oil house and a circulating oil line extends around the shop with a plug tee at each furnace. This enables any one furnace to be tested independently of the main oil supply. A test gas meter is provided for use in making tests when both gas and oil are used. Along with the oil and gas system is the air pressure system. Air is delivered by a centrifugal compressor at 16 oz. pressure to five mains and then to each furnace.

The furnaces used are built to withstand shocks and vibrations, and are completely incased in a steel box lined with fire brick. No induced air is allowed to enter the furnace. The slag opening is normally closed and the only escape of the products of combustion is over the hearth. Above and in front of the hearth is a perforated air pipe deflecting the gases upward. In the upward path of the waste gases is placed a cast-iron pot or preheater through which the pressure air passes over baffles and is heated before it mixes with the oil and gas. Four sizes of furnaces are used and a spare one of each size is provided.

The first exhibit showed a complication of data of a test on a furnace in detail. Readings were taken in half-hour periods of the oil and gas consumption. Both gas and oil were used and reduced to an equivalent of all oil. This test showed 33.3 lb. of steel per U. S. gallon. Taking the oil used during the heating period only a result of 38.3 lb. of steel per gallon was obtained. The test lasted 9½ hr., but steel was in the furnace only 7½ hr. This test consumed 18.80 gal. per hour and cost $2.50 per 1000 lb. of steel heated. Another exhibit showed a compilation of several tests on these furnaces giving average results. An average of eight different runs gave a result of 28 lb. of steel per gal. and a fuel consumption of 19.8 gal. per hr. Other tests showed an economy of 23.2 lb. and 24.2 lb. of steel per gallon. These tests were made upon an old style furnace.

A test of a new furnace of the preheater type showed an economy of 31.8 lb. of steel per gallon of oil and a burning of 4.74 gal. of oil per hour. A test on a large air preheating furnace showed 46.3 lb. of steel per gallon of oil. Another exhibit showed an average of tests on a 42 in. furnace heating axle. This showed a saving of 330 per cent with a new type of furnace as compared with the old furnace.

Some Fuel Economies Effected

It was found that the furnaces were burning about as much oil during meal hours and the time between shifts as when there was steel in them. As the result two men were assigned to watch the furnaces and shut them off during these periods. A factor in furnace economy is the air pressure and to get the proper distribution requires investigation of the air line.

The new furnace installation including the air line was completed last September and cost $33,000. This, however, effected a saving in fuel of $10,000 for the first three months of this year. The paper also dwelt to some length on the subject of the steam distribution charge. Various tests were conducted during the year so that the company was able to make a complete steam distribution charge throughout the entire plant. This study resulted in closing down the 1200 lb. steam hammers and placing the work in the board shop.

Mr. Herdegen said that the Dominion shop was not offered as a model plant, but simply as a suggestion. He thought every forge shop should make tests. He said that wonderful results were obtained without the use of a combustion chamber.

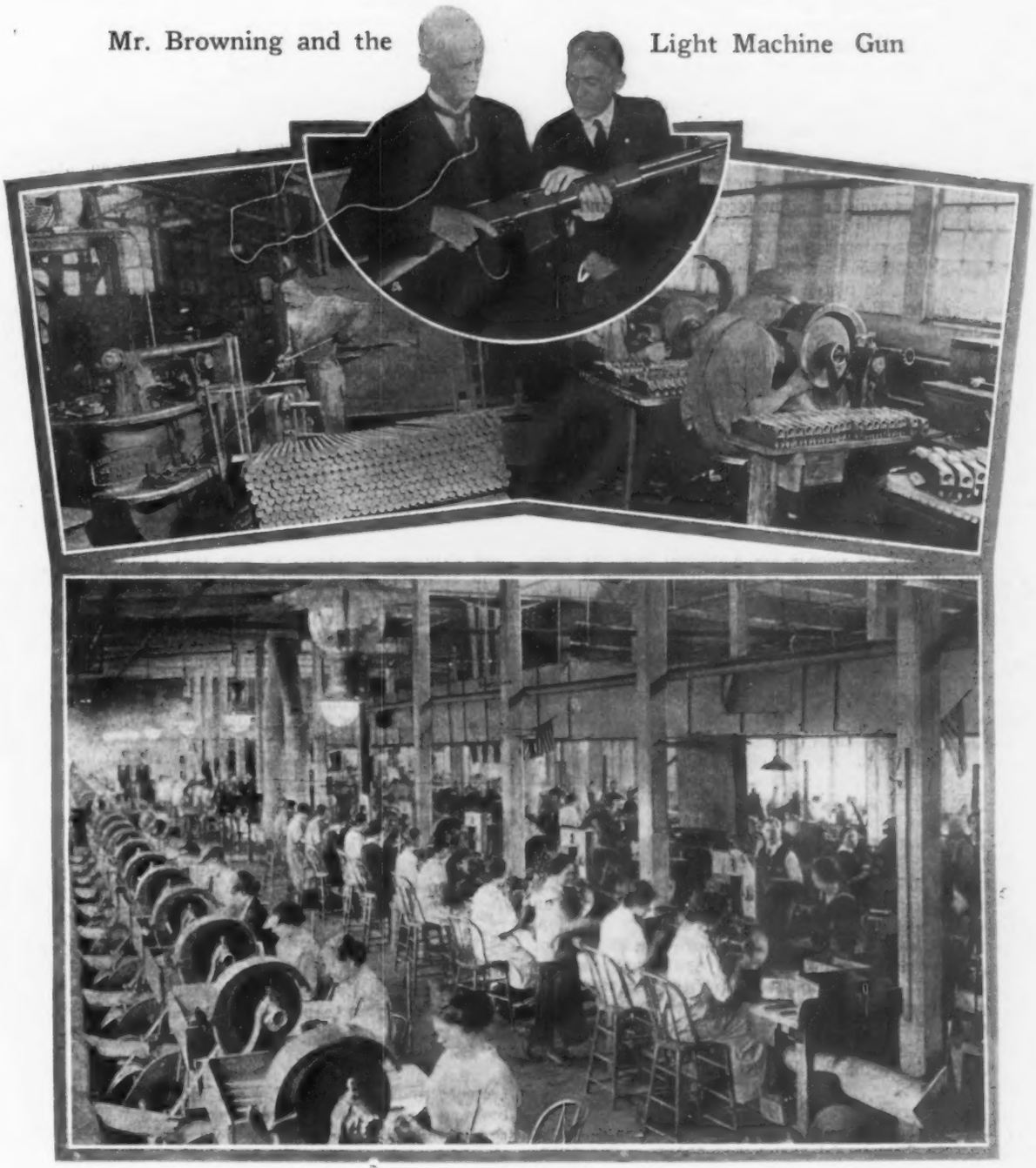
Proper Oils for Quenching

The subject of quenching oils for forging was discussed in a paper on "Highest Quenching Speed Gives Maximum Hardness," in a paper prepared by George W. Pressell, chief chemist E. F. Houghton Co., Philadelphia, and read by Louis H. MacLaughlin, of that company, Mr. Pressell said that in the consideration of oils for hardening purposes care should be exercised to select an oil which will give a uniform quenching speed, which will not produce gaseous vapors at low temperature, and which will not oxidize or thicken with repeated use. The quenching speed of an oil depends on its refrigerating properties, and also on its fluidity, or viscosity. For years animal and vegetable oils of a semi-dry nature, such as whale, fish, cotton seed and linseed oils, were used almost exclusively for the hardening of steel. These oils would harden satisfactorily when fresh or first used, but on continued use the quenching speed would lessen. The fact that uniform quenching speeds could not be obtained with the oils generally used for this purpose instigated considerable research along these lines.

Exhaustive tests have been made with an animal hydro-carbon oil which is a distillation of wool grease, and the resulting product, he said, was an oil possessing a smaller percentage of residue and solid matter in suspension than any other oil known. The extreme fluidity and penetrating properties of this distilled oil convinced the writer that it possessed marvelous powers of heat circulation, marked heat absorbing properties and did not decompose after repeated use. Various tests were given in the paper, showing the time required for quenching material with the various oils and at various temperatures of the quenching bath.

The average quenching speed for distilled wool grease oil was 102 sec., being somewhat less than the speed shown in several other tests. The total variation in time of quenching in temperatures of the bath ranging from 82 to 249 deg. was 9 sec. Under the same conditions cottonseed oil showed a quenching speed varying from 104 to 119 sec. Other tests shown included heat

Mr. Browning and the Light Machine Gun



Beside Mr. Browning, Who Holds a Browning Light Machine Gun Is Mr. Burton of the Winchester Repeating Arms Co. Some of the operations at the Winchester plant are shown, including a grinding and polishing department, where 250 girls are employed

conductivity, oxidation, volatilization, and Brinell hardness tests.

Water as a Quenching Medium

The paper stated that the water quenching of large forgings is very sharp and severe and if not properly handled often results in the failure of the piece after working. The quenching of forgings in oil is fool proof, and the expenditure of money required to properly equip the hardening department with tanks and cooling systems was declared to be fully warranted. The ideal quenching medium for forgings would be a water soluble material which when mixed with water would give a quenching speed through the critical range equivalent to that of water, and from the critical range to the atmospheric temperature equivalent to that of oil. However, a mixture of oil and water has proved unsuccessful. Spreading a small quantity of oil on the surface of water used for quenching to reduce the sharp effect of water has also been tried, but without success. The circulation of oil through a cold water tank for cooling was preferred to circulating cold water through the oil. In brief discussion of the paper Mr. MacLaughlin said that after being used two years wool grease oil showed no indications of having lost its hardening properties.

Piston Breakages in Forging Hammers

The care and maintenance of piston rods was discussed by George C. Stebbins, superintendent of the Cleveland plant of the Wyman & Gordon Co. He said that people used to think that piston rods could be made of almost any kind of steel and breaks were numerous. Now it is regarded as almost necessary to use the highest grades of steel. Only six piston rods have broken during the past year in his plant, having 16 hammers, three of these being broken in one machine and the breaks being doubtless due to the machine. His greatest annoyance has been from the breakage of piston rings. His plant is now using a new

Johns-Manville packing which he has found efficient. Special grooves have to be provided to accommodate it, as it is very thick.

Referring to the maintenance of hammers, he recommended the use of a central oiling system, and explained a system of this type that he has installed in his plant. A steel tank is located near the steam line, a pipe running from this line into the oil tank to secure the proper pressure. The oil is carried in a line from the pressure tank, from which it is fed to the hammer. A ½-in. line carries it to an ordinary sight feed lubricator, and there is a ⅜-in. line above the lubricator which taps into the throttle. The system is so arranged that the oil supply for any hammer can be shut off. He said that in his plant many of the piston rods that are used had heads riveted on instead of using a solid rod, and he found this type of rods satisfactory.

A paper on electric steel making by A. V. Farr, Hess Steel Corporation, is reviewed elsewhere.

An interesting series of moving pictures showing the welding of locomotive frames, crankshaft, flywheels, machinery on ships, small pipe, etc. was presented by W. R. Hulbert, Metal & Thermit Corporation, New York.

Heat Treating in Electric Furnaces

A paper on "The Electric Furnace in the Forge Shop for the Heating of Billets for Forging, and the Heat Treating of Forgings," by T. F. Baily, president Electric Furnace Co., Alliance, Ohio, was illustrated with a number of lantern slides showing various types of furnaces for heat treating. He held that the electric furnace offers an ideal heating medium for steel as it is not necessary to carry such high ruling temperatures for a given temperature desired in the metal, and the furnaces themselves operate normally with a reducing atmosphere at all times. There is consequently a saving of metal due to the lack of oxidation, which in extreme cases of say 5 per cent loss on steel worth $80 per ton would amount to $4 per ton of metal heated. In addition to this the steel being in much better condition when it goes to the hammer or press due to the absence of scale, there is less wear on the dies and less danger of the dies being filled up with scale from the forging itself, as it is sometimes difficult even with an air draft to keep the dies entirely free. In addition, the electric furnace is bound to reduce the number of defective forgings, some of which are always caused by improper heating, either wasting away of the steel if left too long in a fuel fired furnace or to a hard center, so that the steel does not flow well in the dies. The question of the adopting of electric furnaces for the heating operation resolves itself then largely into a matter of cost.

A typical running sheet on an electric furnace of 600 kw. capacity heating 3¼-in. round billets for forging into 3-in. naval shells was shown. The average power consumption per ton was given at a little less than 260 kw.hr., but taking as a basis 300 kw.hr. per ton to cover the delays in starting up on this type of furnace and with power at 1c. per kw.hr., the cost of heating for electricity would be $3 per ton. It was stated that the renewals and repairs should not exceed that of a fuel fired furnace, and in fact these repairs should average much less. Against this charge of $3 per ton for electric furnace operation the fuel oil for a similar furnace operating on substantially 2 tons per hour would approximate in the average plant at least 50 gal. per ton. With a consumption of 40 gal. per ton and oil at 5c. per gal. this charge would be at least $2 per ton. Thus if the metal loss on $80 steel should be over 1¼ per cent or $1 a ton of steel heated, the cost of electric furnace and fuel fired furnace operation would be the same with the exception of a better class of work done on the electric furnace, which would make a greater saving due to the production of more good forgings. The paper stated that on the furnace referred to the difference in metal loss is somewhat over 5 per cent and the reduction in the number of pierced billets rejected is such that in this item alone there would be at least 5 per cent more forgings by the electric furnace heating due to the more perfect heating of the billets.

One view showed an electric furnace for heating automobile gears, this being of the smallest type built, and having a capacity for heating 200 lb. of steel to a temperature of 1650 deg. per hour. This furnace is used by an automobile manufacturer. Another picture showed a continuous electric furnace for heat treating small airplane parts, and another an automatically controlled furnace for heat treating draw bar knuckles.

J. T. N. Hoyt, representing Albert Kahn, architect and engineer, Detroit, gave a talk with lantern slides on "Forge Shop Construction." He said that probably the most unique of the forge shops, pictures of which he showed, was that of the Packard Motor Car Co. This shop has sections sloping down from the side walls to the center monitor, and louvers just beneath the roof in the side walls to permit the escape of gases. The building has no interior columns. The subject of cleaning the windows of the forge shop was brought up and H. N. Taylor, N. & G. Taylor Co., said that in building its tin shop his company had provided both in and outside runways so that the windows could be cleaned without the use of ladders.

Priority Certificates for Tool Steel

An interesting talk on the "Present System of Priority Ruling" was given by T. C. Powell, a member of the Priorities Division of the War Industries Board, and formerly vice-president of the Southern Railway. He said that the work in Washington is getting more simplified but more subdivided. Under a new ruling that has not yet been promulgated, tool steel will be distributed without definite priority certificates. In the case of small tools it is impossible to trace material down to the specific uses to which it is to be put, and consumers of this steel should make application to the Government and explain for what purpose the steel is used. The manufacturers of tool steel will be advised to fill the orders of their regular customers. In reply to a question regarding steel for commercial trucks, Mr. Powell said that the Government recognized a commercial truck as a war essential, the same as a truck purchased by the Government, and that truck manufacturers would not be deprived of their steel.

Two speakers, Dr. Gustave Peterson, Alloys Spring Steel Co., Jackson, Mich., who was to have talked on "Hardening of Die Blocks," and C. R. Poole, Frost Gear & Forge Co., Jackson, Mich., whose subject was to be "Thermal Refinements of Gear Blanks," were not present and their papers will probably be included in the regular proceedings of the association.

After the election of officers President E. J. Frost made a few remarks. He said that the problem of the scarcity of labor, the fitting for industrial activities of maimed soldiers when they return from France and the standardization of products were matters that should be taken up by the association.

A motion was adopted recommending that the board of directors select Pittsburgh as the next place of meeting.

Saturday was spent in visiting the plants of J. H. Williams & Co., the Lackawanna Steel Co., the Sizer Forge Co. and the Buffalo Foundry & Machine Co. Thursday evening many of the forge men visited the foundry of the Otis Elevator Co. and witnessed the pouring of a heat from an electric furnace. The Drop Forge Association entertained those present at luncheon and dinner at the Iroquois Hotel Thursday evening and on the following day those in attendance were guests of the Drop Forge Supply Association at lunch and dinner and a theater party following. A special entertainment was provided for the ladies.

The Keokuk Electro-Metals Co., Keokuk, Iowa, has established an office at 1518 Corn Exchange Bank Building Chicago, through which, as a general office, all sales will pass. The treasurer of the company also will be located at that office, which will be in charge of John Dillon, secretary and treasurer, formerly of the Otis Elevator Co., New York. The company manufactures 50 per cent ferrosilicon.

Bench Drawer of All-Steel Construction

For use in situations where its frictionless type of bench drawer is not suitable, the New Britain Machine Co., New Britain, Conn., is offering another of all-steel construction. The new type is intended to combine lightness with strength, as well as being easy of application and discouraging pilfering of the contents.

The drawer is made in two parts, the drawer proper which measures 18 in. in width, 16 in. from front to back, and 5 in. deep, and the other member consisting



The Use of a Solid Sheet Metal Top Is Relied Upon to Prevent Pilfering of the Contents of a New All-Steel Type Drawer for Workmen's Benches

of a solid sheet metal top and the slideways. All of the joints are welded and a hem of triple thickness is provided around the upper edge, an arrangement which is relied upon to give strength and durability. The slideways are integral with the top and tend to give a smooth, free movement of the drawer without a binding or cramping tendency. The handle is specially shaped and of a size which is designed to give a comfortable handhold.

It is pointed out in connection with the type of bench commonly used that the back plank is thinner than the front one and an open space is left between this plank and the ordinary type of drawer which extends an invitation to dishonestly inclined workmen to pilfer the contents. The use of a solid sheet metal top, however, is relied upon to prevent tampering at the back and to prevent blocking or a lockout through wedging of the contents. Protection against oil or water that might accidentally soak through from above is afforded. The drawer is provided with a cylinder lock, and the locks can be master keyed if desired.

The drawer is sold as a unit and it is pointed out requires no fitting, thus being easily and quickly installed without cutting the bench. When it is desired to install the drawer the two stops are removed and the drawer pulled completely out of the slideways. After the top has been fastened to the underside of the bench with wood screws, the drawer is inserted and the stops replaced.

Canada Encourages Its Iron Industry

The Government of the Dominion of Canada has decided upon a policy of encouraging new iron and steel industries in Canada by offering to purchase all pig iron produced in the country by all new blast furnaces erected during the next two years, says the *Canadian Mining Journal*. It is understood that it will undertake to accept three years' output and that prices paid will be governed by the market conditions at the time. The Province of British Columbia has taken similar action.

The Iron Bounties Act binds the province to give a bounty of $3 per ton on all pig iron manufactured from British Columbia ore in British Columbia and $1.50 per ton on all pig iron manufactured in British Columbia from foreign ore.

The Aetna Chemical Co., whose plant at Oakdale, Pa., near Pittsburgh, was destroyed by explosion, is planning to build another plant in the Pittsburgh district, but high explosives will not be made. Inquiries should be addressed to Benjamin B. Odell, Jr., care of the company.

The Cleveland Furnace Co. has blown out one of its furnaces at Cleveland for relining.

Making Turning Tools by Arc Welding

An arc-welding equipment built by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has been recently installed by a large munition manufacturer. The equipment is employed for the sole purpose of making shell turning tools and for several weeks a daily output of 240 welded tools has been maintained.

The equipment installed consists of a 500-amp. arc-welding motor generator with a standard control panel and four outlet panels distributed about the shops at the most advantageous points for doing the work. This arrangement makes it possible for the workmen's tools to be made nearer the points at which they will be used rather than bringing them to a central location near the main control panel and then consuming time in returning them after they have been made. Three of the outlet panels are intended for metal-electrode welding, while the fourth is equipped for the use of either metal or graphite electrodes. This last panel is designed to take care of any special filling or cutting work which may be necessary from time to time, although ordinarily it is employed the same as the other three panels for making tools.

In connection with the making of the tools, a preheating oven is employed on account of the extreme hardness of the steel used. This it is pointed out is not necessary to secure a perfect weld but is employed since the hard steel is likely to crack from unequal cooling. A further



Attaching a High-Speed Steel Tip to a Shank of Carbon Steel by the Arc-Welding Process Enables a Munition Manufacturer to Effect a Marked Reduction in the Cost of His Shell Turning Tools

advantage claimed for preheating is that the tool can be finished easier after the welding process has been completed. For ordinary arc-welding operations this oven of course is not needed.

It is stated that when a tool of the kind used is made from high-speed steel, the cost is approximately $12. By using the high-speed steel for the tip only and welding it to a shank of carbon or machinery steel, as is the case in this plant, the tools are produced at a cost of from $2 to $4 each.

Government Engineering Employment Service

Government supervision of employment for technical men has been inaugurated by the United States Employment Service, through the establishment of a division of engineering with A. H. Krom, Chicago, formerly secretary of the American Association of Engineers, as director. Mr. Krom is a graduate of Purdue University. Recently he was engineer in charge of the Chicago office, State Public Utilities Commission of Illinois. The engineering employment service will be started through an office at 29 S. LaSalle St., Chicago, where technical men may register for emergency government work or for classification.

Smith & McCrorken, Inc., distributors of iron, steel and metal products, are now located at 407 East Eighteenth Street, New York, where larger quarters have been secured.

Conditions in Contracting for War Material

General Specifications of General Engineer Depot Which Have Practically Been Adopted by War Department Bureaus

WASHINGTON, June 25.—To put an end to the practices of so-called manufacturers' agents who have established themselves in Washington, the Attorney General has devised a stipulation intended to be inserted in all contracts made by the Government hereafter. This provision is described in a letter which the Attorney General has addressed to all members of the Cabinet, heads of bureaus and other governmental agencies placing contracts for material or work in part as follows:

A situation which has arisen in the matter of Government contracts seems to me to require summary action. Owing to the tremendous increase in Government business and the speed with which some of it must be executed, some manufacturers, because of ignorance or misinformation, have thought it necessary to negotiate with the Government through contract brokers or contingent-fee operators.

It follows that the system requires a contractor in making his estimate to load his bid with the contingent-fee item. The courts have universally condemned the contingent-fee contract. The methods employed by the contingent-fee operator are often insidious and reprehensible, and in view of the fact that the average fee is 5 per cent, the resulting cost to the Government is very great.

As a means of breaking up this practice, I have prepared the following form of covenant, which the President requests shall be inserted in all Government contracts:

"The contractor expressly warrants that he has employed no third person to solicit or obtain this contract in his behalf, or to cause or procure the same to be obtained upon compensation in any way contingent, in whole or in part, upon such procurement; and that he has not paid, or promised or agreed to pay, to any third person, in consideration of such procurement, or in compensation for services in connection therewith, any brokerage, commission, or percentage upon the amount receivable by him hereunder; and that he has not, in estimating the contract price demanded by him, included any sum by reason of any such brokerage, commission or percentage; and that all moneys payable to him hereunder are free from obligation to any other person for services rendered in the procurement of this contract. He further agrees that any breach of this warranty shall constitute adequate cause for the annulment of this contract by the United States, and that the United States may retain to its own use from any sums due or to become due thereunder an amount equal to any brokerage, commission, or percentage so paid."

As an additional protection it is requested that your department adopt as a regulation the following language taken from section 3722, page 735, Revised Statutes, as applied to the Navy Department: "And no person shall be received as a contractor who is not a manufacturer of or regular dealer in the articles which he offers to supply." This will synchronize the action of officials of your department with that of the contractor who is prohibited by section 3737, Revised Statutes, from transferring his contract or order, or any interest therein, to any other party.

With a view to standardizing as much as possible the conditions under which war material of all kinds will be procured by contract, the bureaus of the War Department have practically determined to adopt a series of general specifications framed by the General Engineering Depot for the guidance of bidders. These specifications take into account manufacturing conditions that have arisen during recent months in various sections of the country and they are also designed to remedy certain abuses that have grown up as the result of the impossibility, owing to the enormous volume of governmental purchasing, of exercising the close supervision over buying that was practicable during times of peace. Under the terms of these specifications the Government would discriminate against bidders proposing to manufacture goods in the congested districts and also against those already loaded up with governmental orders. A strict rule is promulgated with reference to the substitution of articles not specified, partial payments are provided for under certain conditions and a new regulation is laid down for the payment of customs drawbacks on imported materials entering into the manufacture of goods subsequently purchased by the Government for shipment to France. The new specifications are as follows:

1. *Award.*—In general, the material covered by these specifications will be awarded by item or by lot, as may be deemed most advantageous to the United States; however, the right is reserved, if necessary, to secure prompt deliveries, to divide award under any items among several bidders, but no bidder will, by virtue of his proposal, be required, without his consent, to accept an award less than the total number of articles specified under a given item number. The bidder shall state in his proposal the number of calendar days after receipt of the notice of award within which he will make complete delivery, and if the proposal form so pro- month to continue until delivery is completed.

The best interests of the United States, prompt delivery, cost and the ability which the bidder has previously shown to meet his promises of deliveries will be considered in making awards. The right is reserved to reject any or all bids, and to waive any informalities in the bids received. Bidders are requested to submit, if practicable, proposals strictly in accordance with specifications; if they desire to recommend the use of a substitute article, then this information should be covered by alternative proposals.

2. *Localities in which orders will not be placed.*—Because of the known shortage of power in certain manufacturing districts, and in order to conserve this power for the rapid completion of Government contracts already under way, bidders will be required to state on demand the localities from which the materials entering into the manufactured articles are obtained, and the purchasing officer reserves the right in making awards to discriminate against those bidders who are dependent upon the manufacturers in congested districts for their materials.

3. *Other Government orders.*—Bidders shall state in writing upon the request of the purchasing officer after the proposals are opened the total money value of uncompleted orders already placed with them by the United States and the Allied Governments. Bidders shall also state at that time the class and number of principal and subsidiary priority orders which may have been issued on their manufactured products, affecting directly or indirectly the article upon which they are bidding. This information will be considered confidential.

4. *Contracts.*—Bidders shall be required to enter into written contracts in proper form if demanded by the purchasing officer. Contracts, if resorted to, will require a bond to the extent of 20 per cent of the amount of the contract, and will not provide for liquidated damages or penalties for failure to deliver within the time specified by the bidder.

5. *Should a change in the international situation* at a later date render cancellation of orders and termination of contract necessary, then equitable terms of such cancellation or termination as may be mutually agreed upon will be embodied in a supplemental agreement at a time when the advisability of such action becomes apparent.

6. *Quality of material.*—Only first-class material will be offered, and the acceptance of one article which later proves defective in material, workmanship, or design, or inadequate for the purpose for which it is offered, shall not be considered as necessitating the acceptance of similar articles by the purchasing officer.

7. *Samples.*—Samples when requested shall be furnished and marked with the proposal number, the requisition item number, name and addresses of manufacturers and with the manufacturer's catalogue reference number. All samples shall be sent prepaid and consigned to: "Purchasing Officer, General Engineer Depot, 1438 You Street, N. W., Washington, D. C."

8. *Catalogs.*—Each bidder shall submit catalogs when such are available, in which shall be clearly indicated the items covered by his proposal.

9. *"Or equal."*—When an article which the bidder considers the equal of that specified is offered, the bidder shall state, in the space provided under the item of the proposal, the name of the manufacturer and the catalog number of the article offered. If no entry is made it will be under-

stood that the exact article specified in the proposal will be furnished.

10. *Volume and weights.*—Bidders shall in all cases state in the space provided their estimate of the volume in cubic feet and weight in pounds of each item upon which they submit a bid. Bidders are especially requested to estimate these fairly and carefully, as they are of the utmost importance in determining shipping space required by this office.

11. *Inspection.*—All material to be furnished shall be subject to rigid inspection by the purchasing officer or by inspectors appointed by him. The decision of the purchasing officer as to acceptability under the specifications of the articles offered for inspection shall be final. He and his inspectors shall be allowed access to the work at all times and shall be given every possible facility for inspecting the material. Inspections may be made both during the progress of the work and when the material is completed and offered for final acceptance. The bidder shall state in his proposal all names and addresses where the material will be offered for inspection. When required, the material and ordinary labor necessary for making tests shall be provided at the expense of the contractor. Any or all inspections may be waived in the discretion of the purchasing officer.

12. *Packing.*—All articles will be securely and properly packed for export shipment.

13. *Shipment.*—Shipment will be made on Government bill of lading. Instructions relative to packing lists, markings, billing, etc., will be given in detail at the time awards are made.

14. *Payment.*—Payment will ordinarily be made for each item as soon as it has been inspected, accepted and delivered, properly packed, f.o.b. cars (or boat) at place stated in proposal. Under certain conditions, in the case of standard products the sufficiency of which in their completed form is already known from previous use, partial payments to the extent of a previously agreed upon percentage of the total cost of each component part of the article to be furnished, will be paid when such component parts are known to be on hand in the factory ready for assembly. Such component parts will then become the property of the United States, and be safeguarded by the manufacturer in a way acceptable to the purchasing officer, in order to prevent loss to the United States through destruction or theft of same.

15. At the end of the proposal blank will be found the following: Terms ..... per cent discount for payment within 10 days from date of invoice. Net cash 30 days from date of invoice. If cash discount is not allowed, then the clause referring to same should be ruled out by bidder.

16. *Customs drawback.*—It is understood that all rights of drawbacks are reserved by the United States, and that no drawback will be paid by collectors of customs on entries filed on the material supplied under these specifications.

Chrome Ore Output in 1917 and 1918

WASHINGTON, June 25.—The production of chrome ores in the United States is being steadily increased under the stress of war necessity and for the year 1918 promises to exceed by more than 25 per cent the output of 1917, according to a bulletin just issued by the U. S. Geological Survey. The United States needs about 150,000 tons of chrome ore of various grades for 1918, chiefly to make ferrochrome steel for munitions, but largely also for chemical use and for making refractory materials. Imports from South Africa and New Caledonia are practically cut off by lack of shipping, but are replaced, in part at least, by imports from Canada, Newfoundland, Cuba, Brazil and Guatemala. A large part of the supply must come from the United States and the more the better to save shipping.

According to the latest report by J. S. Diller, of the U. S. Geological Survey, the output of chromite in the United States in 1917 was 43,725 gross tons, of which the greater part came from California. Oregon produced 7,506 tons, and smaller quantities came from Alaska, Washington, Maryland and North Carolina. This year the promise of a considerable increase is good. The large consumers are paying $1.25 a unit for 38 per cent ore—or $47.50 per ton—f.o.b. cars on the Pacific coast, on contracts extending through the year. For 30 per cent ore 65c. per unit is offered—or $19.50 per ton.

Low grades should be concentrated if possible. About a dozen concentrators are already either in operation, in course of construction, or in contemplation in California and Oregon. A most hopeful sign is that some of the large deep-gold-mining companies are using parts of their stamp mills, especially in Nevada county, for crushing and concentrating low-grade chrome ore.

The ore sold on the Pacific coast in 1917 ranged in grade from 30 to 55 per cent of chromic oxide and the average was about 42 per cent for the total output, 43,725 gross tons, sold during the year at an average price of $26 a ton. The minimum price for most of the same ore to-day would be $47.50 a ton.

Notwithstanding the bad winter weather the domestic production of chromite during January, February and March, 1918, was 11,448 tons. The total production in April appears to be about 6245 tons, making the output for the first four months of 1918 of 17,693 tons, equivalent to 14,862 tons of 50 per cent ore. That is less than one-third of the total domestic production expected in 1918. The most active season for mining chrome ore is just opening and the outlook is encouraging. According to the United States Shipping Board chrome ore is on the preferred list, so there should be no delay in getting the ore to the consumer.

W. L. C.

A Low-Tension Dead Front Switch Panel

A line of dead front panel switches representing an important safety first development is being made by the General Electric Co., Schenectady, N. Y. The primary office of the panels is for the distribution of light and power in factories, where switchboards are generally operated by inexperienced employees.



All of the Current Carrying Parts Including the Fuse Clips Are Mounted on the Back of a Sheet Steel Panel, thus Avoiding Accidents

The panel frame is built of riveted angle iron and the current carrying parts back of the panel are inclosed by expanded metal. A switch unit consists of a standard knife switch and fuse clip parts mounted on a slate base and supported by iron studs at the back of a 3/16-in. sheet steel panel. The operating handle resembles the handle of an oil circuit breaker and is in a vertical position when the switch is closed and at an angle of 60 deg. when the switch is open. The steel panel of the switch unit has a door which is hinged at the top, permitting it to open upward as far as the stop on the operating handle behind which it is mounted. This door gives access to the fuses from the front of the panel, and it is pointed out that the switch cannot be closed when the door is open or the door opened without first breaking the circuit. It is thus possible to inspect or replace fuses at any time, and the operator cannot come in contact with the current carrying parts, since the fuses are on the load side of the switch.

New Steel Castings Company Buys Harvey Plant

The Allied Steel Castings Co., Chicago, a new corporation organized under the laws of Illinois, has taken over the steel castings plant now operating as a going concern by the Whiting Foundry Equipment Co., West Harvey, Ill. Additional melting equipment will be immediately installed to increase the output. The company has business booked on which to operate for some time. Its address is West Pullman, Ill. The officers are: John T. Llewellyn, president; C. J. Nash, vice-president; James S. Llewellyn, secretary-treasurer, and W. H. Tobias, assistant secretary.

DOUBLE HEAT TREATMENT

Compilation of Literature with Special Reference to Armor Plate and Guns

A bibliography of the most important books and articles on the double heat treatment of steels with special reference to the manufacture of armor plate, guns or parts thereof, gun forgings and allied phases of this subject has been prepared by E. C. Buck, New York. This compilation supplements others by Mr. Buck on "Plastic Metal Deformation" and "Hydraulic Forging Presses," published in THE IRON AGE, Nov. 1, 1917, and Dec. 20, 1917, respectively.

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Jour. Iron & Steel Inst., 1882, No. II, pp. 509-518.
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1890—Smith, W.
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Jour. Soc. Chem. Ind., 1890, Vol. IX, p. 145. Discussion by Messrs. J. Bernays and A. H. Allen. Definition of tempered steel.

1895—Ausher.
Study of the steels suitable for engine construction.
Annales des Mines, 1895, 9ième Sèrie, vol. VIII, pp. 566-568.

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The method of or process for improving or perfecting steel armor plates and other steel articles.
British Patent No. 8047, April 23, 1895.

Le Chatelier, A.
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Bull. Soc. d'Encouragement pour l'Industrie Nationale, 1895, pp. 1336-1352.
Stahl und Eisen, 1896, vol. XVI, pp. 200-201.

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Publication Soc. des Ingénieurs sortis de l'Ecole Provinciale du Hainaut, 1896, vol. V.
Reprinted in: Revue Univ. des Mines, 1896, Nov., vol. XXXVI, pp. 224-236. Abst. Stahl and Eisen, 1897, vol. 17/I, pp. 49-50. Dingler's Polytechn. Journal, 1897, vol. 305, pp. 263-264.

1904—Brayshaw, S. N.
Hardening high-speed tool steel.
British Patent No. 12,817, June 7, 1904.

Hadfield, R. A., Sheffield.
Manufacture or treatment of armor plates and other articles of steel.
British Patent No. 15,220, July 7, 1904. U. S. Patent No. 831,858, Sept. 25, 1906.

1906—Hadfield, R. A., Sheffield.
Manufacture or treatment of steel armor plates.
U. S. Patent No. 834,904, Nov. 6, 1906. British Patent No. 4107, Feb. 19, 1906. French Patent No. 370,155, Oct. 2, 1906.

Pierard, A.
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Congrès International de Liége, Section de Métallurgie, 1906, vol. I, pp. 229-253.

1907—Nolly, H. de, assignor to Compagnie des Forges et Aciéries de la Marine et d'Homécourt, St. Chamond (France).
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British Patent No. 25,742, Nov. 20, 1907. French Patent No. 391,827, Sept. 7, 1907. U. S. Patent No. 957,706, May 10, 1910.

1908—Benedicks, C.
Experimental researches on the cooling power of liquids, on quenching velocities, and on the constituents, troostite and austenite.
Jour. Iron & Steel Inst., 1908, vol. 77/II, p. 206.

1909—Guillet, L.
Remarks on the thermal treatment of steels.
Seventh Intern. Congress of Applied Chemistry, London, 1909, vol. III (A-B), pp. 43-47.

Wales, S. S., assignor to Carnegie Steel Co., Pittsburgh.
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Wales, S. S., assignor to Carnegie Steel Company, Pittsburgh.
Method of treating armor plate.
U. S. Patent No. 941,477, Nov. 30, 1909.

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Revue de Métallurgie, 1910, vol. VII, pp. 501-510.

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French Patent No. 415,389, April 29, 1910. U. S. Patent No. 1,110,395, Sept. 15, 1914. British Patent No. 9108, April 14, 1910.

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Amer. Mach., 1912, vol. 36, p. 537.

Cubillo, General L.
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Hantke, G.
Steel and process for transforming it into steels of various qualities.
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Soc. Anonyme Italiana. G. A. Armstrong & Co.
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French Patent No. 442,299, April 6, 1913. British Patent No. 9512, April 22, 1912. U. S. Patent No. 1,086,459, Feb. 10, 1913.

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Method of treatment of armor plate.
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(Serial designation A 37-14.)
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London, 1914, p. 9.

1916—Sauveur, A.
The metallography and heat treatment of iron and steel.
1916, 2d edition, pp. 239-242.

Status of American Aircraft Production

In his first speech since the recent reorganization of the Aircraft Board, Howard E. Coffin gave an encouraging view of the present aircraft situation in this country, at the semi-annual meeting of the Society of Automotive Engineers, held last week at Dayton, Ohio. Some extracts from it are given below:

The Navy has done most remarkable work in flying daily with aircraft weighing up to 11,000 to 12,000 lb. and equipped with engines of 400 to 1000 hp. and carrying crews of five men. Within the last week two of the Liberty engines were taken from stock, put into a stock boat, flown up and down the river a couple of times to make sure that everything was all right, and then a trip was made of some 280 miles, from Philadelphia to Newport News, without missing a "shot" on either engine.

The Navy, because of its work on detection of submarines, has started immediately with the large sizes. The new naval aircraft factory at Philadelphia has a floor space of about three-quarters of a million feet.

Plants in this country are producing and others will produce aircraft of standardized interchangeable designs. Airplanes are being shipped from this country in a disassembled form without markings. The crates, when received on the other side, can be opened and the parts assembled without any regard to the building operation on this side. A cable received only a few days ago stated that, within a few hours of the receipt of a certain shipment upon the other side, planes were assembled and the engines running.

I think it is a fact that can be borne out by any representative of the British service that after three years of war, with some 10,000 men in the main works, the leading British company is producing 50 engines per week, and each develops 50 hp. less and weighs 100 lb. more than the Liberty. It is America's purpose to build engines not only for our own Navy, our own Army, but for foreign countries as well. There is a great difference between 50 engines a week and 50 to 100 engines a day, an output any one of a half dozen of the plants of this country plans to be producing inside of the next 90 to 120 days.

The wireless, wireless telephone, bomb-dropping apparatus, oxygen tanks for breathing at high altitudes, electrically-heated clothing, generators, flares for landing at night, scientific instruments for recording speed, altitude, inclination, and a half dozen other things, synchronized machine guns—practically none of these were produced in this country a year ago. The development in this country of a substitute for linen made of Sea Island long staple cotton, which has in actual test been proved the superior of linen, is another of the great influences in the development of aircraft. The latest experiments have shown that Douglas fir is not only the equal of spruce but is probably the superior, so that very much of the spruce difficulty will be removed.

MANGANESE ORE IN VIRGINIA

The Deposits in Nelson County, Their Character and Availability

BY MARSHALL HANEY*

THE chief interest in any description of the manganese deposits of Nelson County, Va., lies in the great possibilities this county affords for the early production of high-grade manganese ore. It is located in the Piedmont province of Virginia, and workable deposits of manganese of good quality are found in the following counties of the same province: Albemarle, Amherst, Appomattox, Buckingham, Campbell, Pittsylvania and Spottsylvania. In some of these, mines yielding a large production of high-grade manganese ores have been operated for many years.

After carefully going over the field the greatest possibilities lie in the deposits in Nelson County, near Warminster, a station on the James River division of the Chesapeake & Ohio Railroad, 47 miles from Lynchburg and 100 miles from Richmond. The surface of this section rises abruptly from the level of the James River and most of it is from 200 to 400 ft. above the river.

This section produced its first ore in the early 60's, and official reports state that one mine, the Cobell, produced 5000 tons during the early operations. This ore was shipped to England, the principal if not the only market for manganese ore at that time. The Simpson mine, located on this same formation, which extends about 2 miles in a northeast and southwest direction, produced over 1000 tons of ore having the following analysis:

	Per Cent
Manganese dioxide	90.42
Iron sesquioxide	2.24
Alumina	1.13
Lime	1.22
Magnesia	2.28
Silica	1.12
Manganese (metallic)	57.16
Iron (metallic)	1.56
Phosphorus	0.188



Large Masses of Manganese Ore

Work on the mines of this locality was discontinued about 1880, due to competition with the cheaper mined and better grade of ore from India, Brazil and Russia. The methods of mining and the business conduct of the operators could have been improved.

*Consulting mining engineer, Geer, Greene Co., Va.



A Mine Producing Small Nodular Ore

The ores of this section occur in pockets, or rather a series of pockets, often near the surface, and the early operators sought out only the surface pockets without carrying on exploration or development to deeper pockets. The open-cut method used in mining limited the profitable operation to the shallow deposits under favorable mining conditions, and the ore was sorted by hand and washed in a very crude manner.

The manganese deposits in this locality are very similar to those farther south, particularly the Piedmont property, southeast of Lynchburg, all being the result of the concentration of manganese minerals by the breaking down of the regional rocks and the accumulation of manganese in physically favorable localities.

The ore commonly occurs as nodules in layers of yellow and brown clay. The clays vary greatly in width, from a few inches to 20 ft. and more. Most of the ore is in the form of kidneys or nodular masses, ranging from a few ounces to 500 lb. The ore is mainly granular pyrolusite.

By the use of modern mining methods and machinery these deposits could be made in a short time producers of a good tonnage of high-grade ore that would materially reduce the present shortage of manganese.

Cincinnati Metal Trade Visit to Dayton

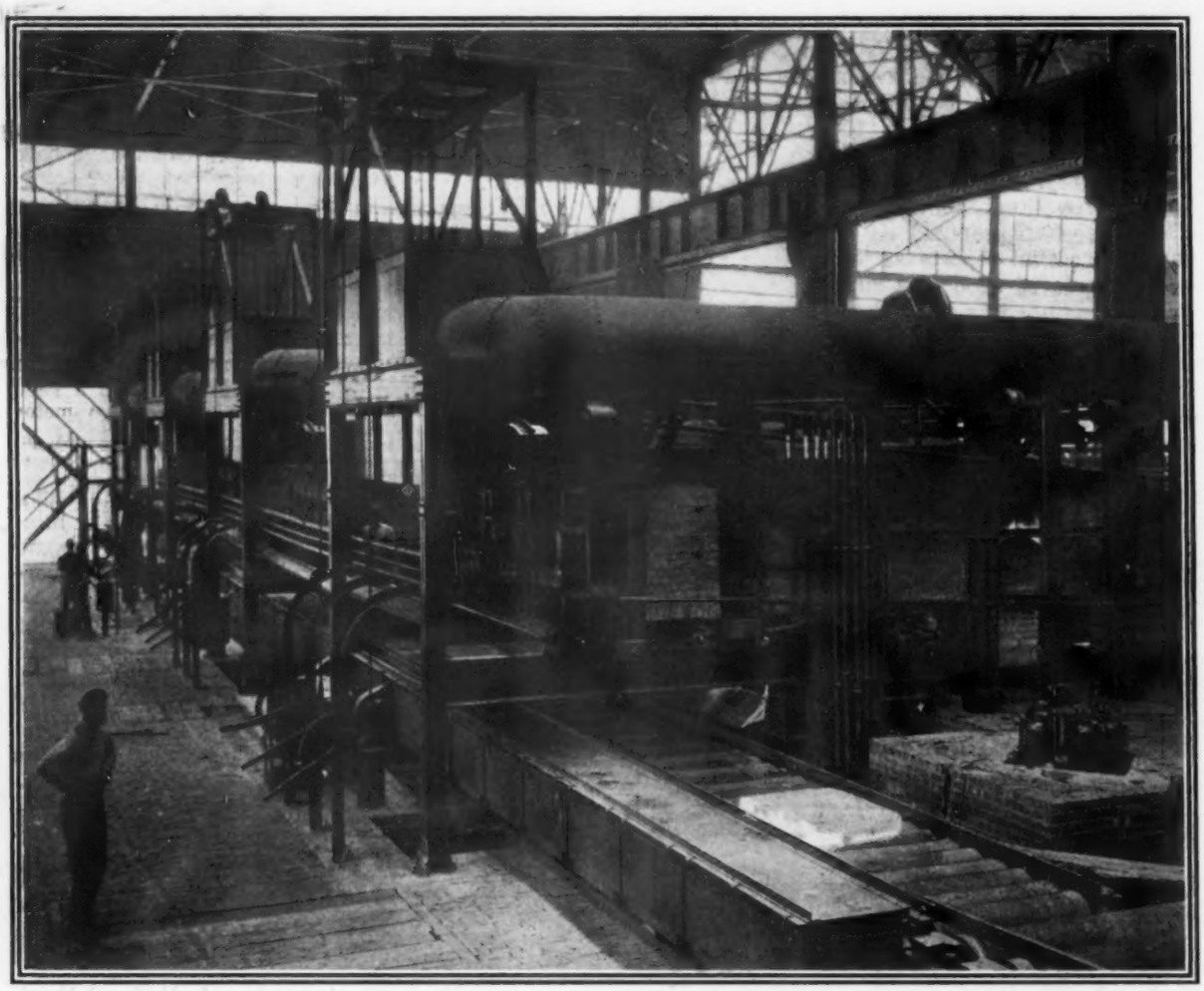
On June 18, the Cincinnati branch, National Metal Trades Association, headed by J. B. Doan, president, motored to Dayton, Ohio, for the purpose of inspecting plants there operating metal working machines. The party assembled at the plant of the Recording & Computing Machine Co., and was welcomed by President W. F. Ohmer and Vice-president C. U. Carpenter at luncheon at the Miami Hotel. Mr. Doan was toastmaster. Mr. Carpenter described the vestibule school system for training women in different departments of the company's plants. C. Seifreat, Seifreat-Woodruff Co., gave an outline of the system at the Dayton Industrial Institute for the quick training of workmen. In the afternoon the party inspected the Dayton Wright Airplane Co.'s plant.

The Bertolette Machine Tool Co., Jersey City, N. J., has established offices at 359 West Side Avenue, Jersey City, but the machine shop and warehouse will remain at 220-228 Orient Avenue.

Youngstown Sheet & Tube Tandem Plate Mill

Continuous Slab-Heating Furnaces and New Type of Plate Turnovers Among the Features—Capacity 15,000 Tons Per Month

IN THE IRON AGE of Oct. 11, 1917, appeared an illustrated description of a new bar mill installed by the Youngstown Sheet & Tube Co., at East Youngstown, Ohio. Since that time this company has completed also at East Youngstown, a large tandem plate mill, largely designed by the company itself, and built by the Mesta Machine Co., Pittsburgh. This mill was put in regular operation on Monday, June 17, and is designed to finish sheared plates 74 in. wide and in any lengths up to 50-ft. Slabs for this new plate mill will come from the adjacent blooming mills, and the mill is expected to turn out, when running full, about 15,000 tons of sheared plates per month. The distinctive features of the mill are the absence of hydraulic and steam machinery, the elimination of all exposed wiring, the grouping of controlling apparatus at a minimum number of points and a double line of cooling tables.



Delivery Side of the Continuous Slab-Heating Furnaces

The total floor space occupied by the plate mill buildings is approximately 210,000 sq. ft. The mill and furnace building is 80 x 300 ft., and houses both the mills and the continuous heating furnaces employed. It is equipped with a 40-ton crane with 15-ton auxiliary hoist and standard gage track for unloading materials. The slab yard is 80 ft. wide and 340 ft. long, and is equipped with two 10-ton single hook cranes with magnet drum and standard and narrow gage tracks for handling slabs. This building is built parallel with the mill building. The motor room is 80 ft. wide and 160-ft. long, with brick walls and as indicated in the accompanying plan, is alongside the mill building. It houses the two 2000-hp. motors which drive the mills and all control equipment for them, and is equipped with a 20-ton single hook crane and standard gage track.

The conveyor building, which is in line with the mill and furnace building, is 80 ft. wide by 520 ft. long. It houses the conveying machinery, straighteners, turnovers, rotary shear and end cut shear, and is equipped with a 10-ton single hook crane. The warehouse is 93 ft. wide and 320 ft. long, and at the end of, and at right angles to the conveyor building. In it are the trimming shears, circle shear, castor floor and shipping tracks; it is equipped with two 10-ton cranes with magnet drums.

The buildings are of steel construction and were erected by the Blaw-Knox Co., Pittsburgh. All the buildings, except the slab yard building are built with the Pond type inverted monitor roof and equipped with Lupton top hung sash in the monitor, and with United steel sash, made by the Truscon Steel Co., Youngstown, for the side walls. The side walls have two runs of continuous sash, each 5 ft. high, around all buildings except the motor room, which building, having brick walls, is provided with pivoted ventilating sash. The 40-ton

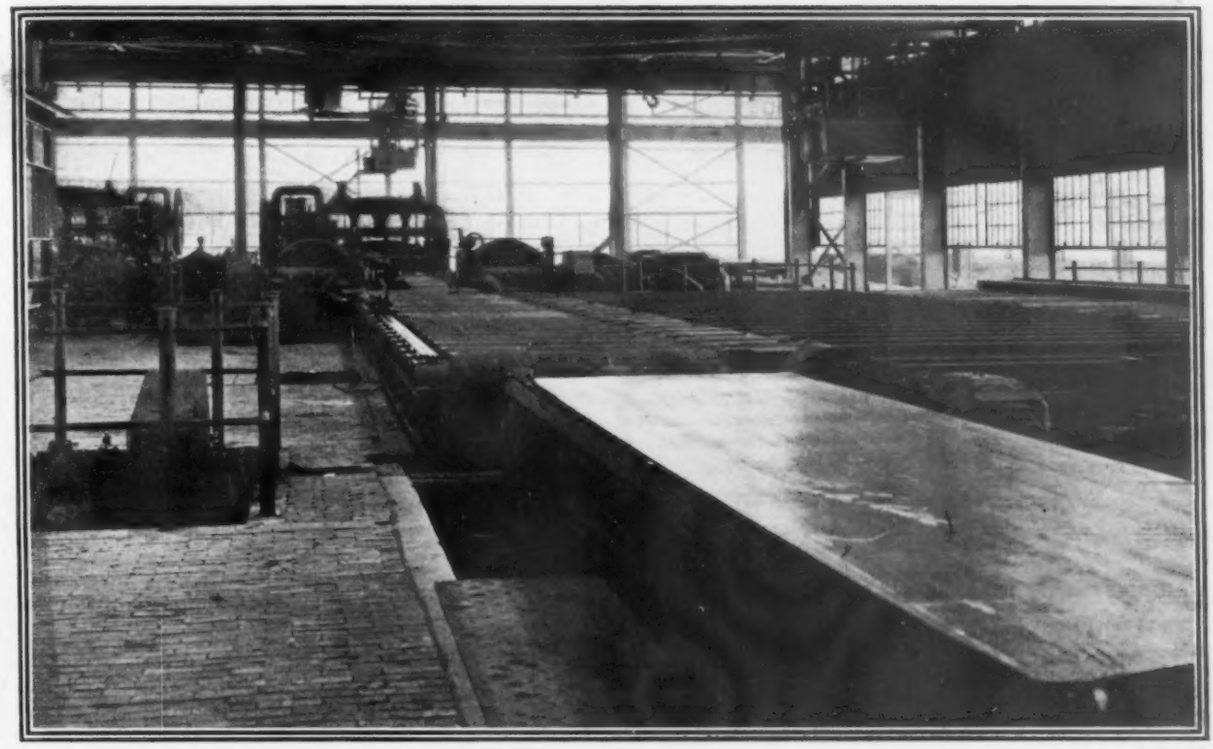
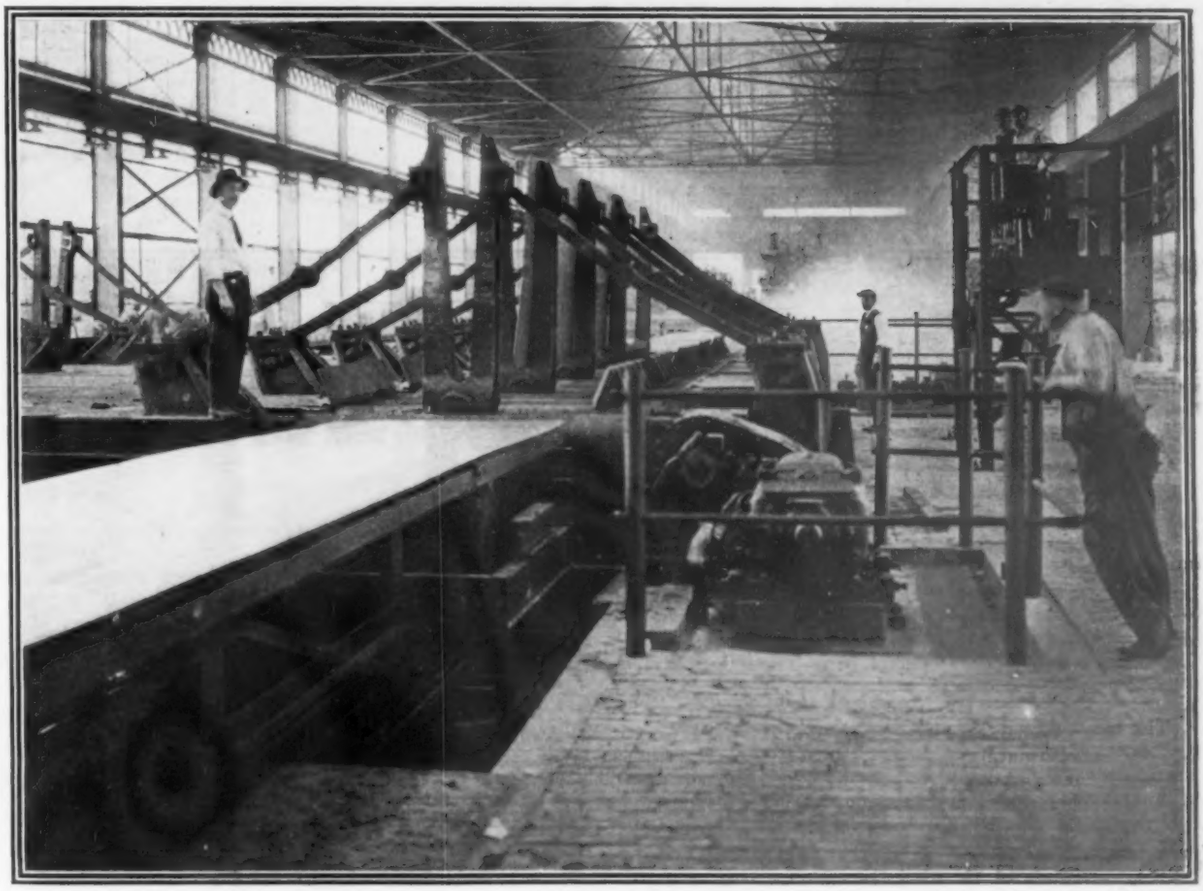


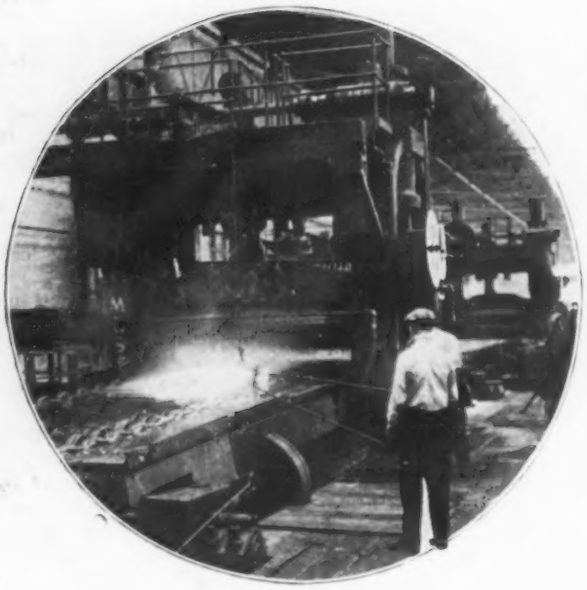
Plate Being Delivered from Chain Conveyor to Roller Table Leading to Double Rotary Trimming Shear

crane in the mill building and the 20-ton crane in the motor room were furnished by the Cleveland Crane & Engineering Co. The 10-ton cranes in the rest of the buildings are of high speed, furnished by the V. R. Browning Co.

There are four Laughlin gravity discharge continuous heating furnaces 12 ft. wide by 45 ft. long over all, and they are operated on coke oven gas. Each is equipped with an electrically-driven slab pusher, built by the United Engineering & Foundry Co. A motor-driven slab table, built by the Morgan Engineering Co., delivers the slabs to the mill tables. The floor around the furnace is raised to a convenient height for operation by means of retaining walls of concrete, and the



One of the Two-Plate Turnovers, Which Are of a New Type



The Three-High Roughing and Finishing Mills Arranged in Tandem Are Practically Identical

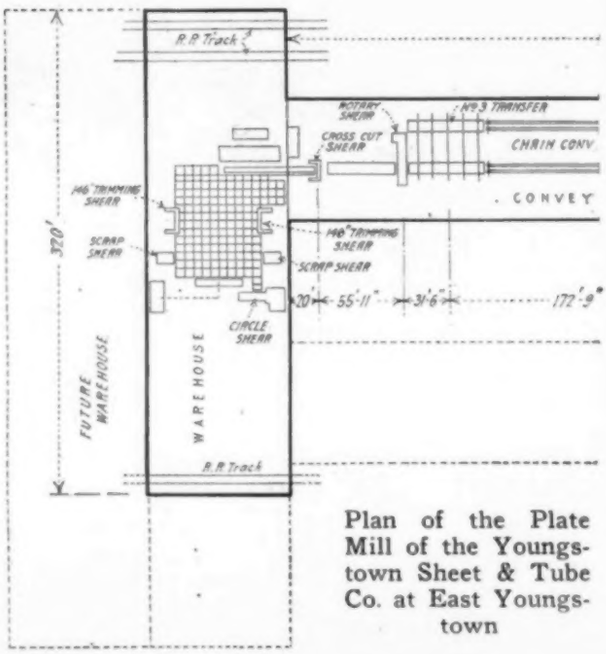
permanent fill is paved with brick. This feature eliminates the use of steel or wooden platforms.

The roughing and finishing mills are duplicates in all respects except for a difference of 12 in. in the length of the rolls. They are of the three-high type with 32-in. top and bottom rolls and 22-in. middle rolls, and were furnished complete with tilting tables and pinions by the Mesta Machine Co. The middle roll lifting mechanism as well as the table tilting mechanism are electrically operated, the only hydraulic power used on the entire layout being a constant-pressure cylinder for balancing the top roll. Each mill is driven by a 2000-hp. 6600-volt 25-cycle 3-phase Allis-Chalmers induction motor, which runs at 81 r.p.m. and is connected by spindles to the middle pinion in the pinion housing. The speed reduction in the pinion housing is as 14 to 20, therefore the speed of the mill rolls is 56 r.p.m.

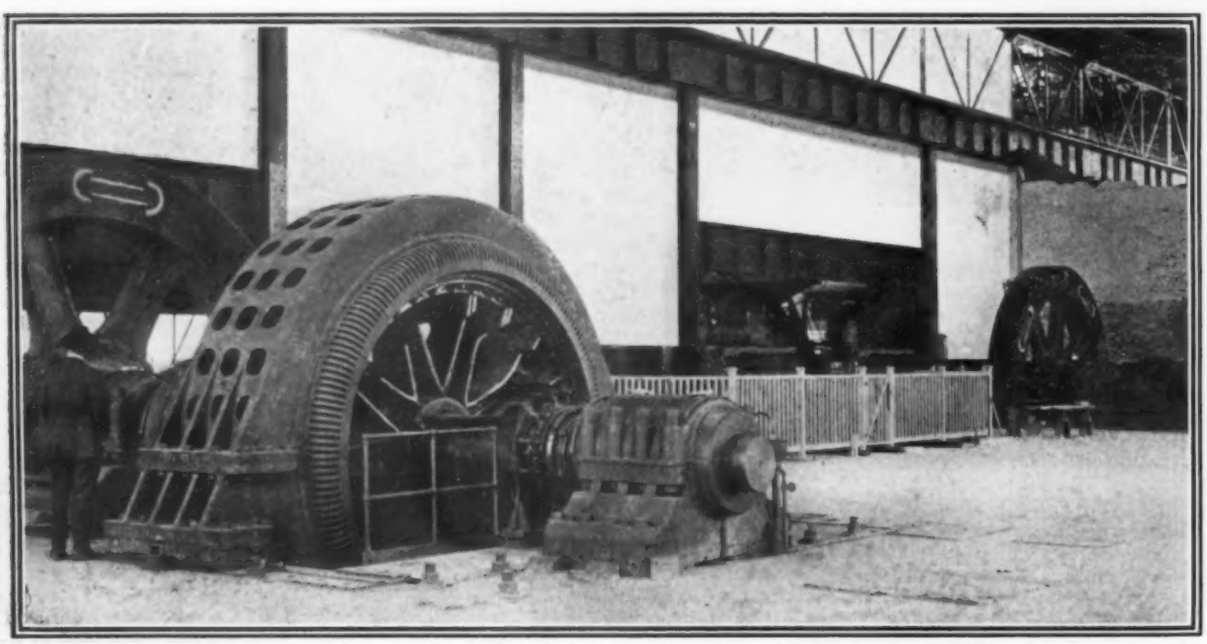
The mills are of massive construction. The roll stands are located tandem 88-ft. 4-in. apart and the intervening space is occupied by an intermediate table, which also acts as a receiving end for a chain transfer for moving the plates for the second line of tables, which run parallel to the mill tables and at a distance of 28 ft. 6 in. apart. These tables are also of Mesta manufacture.

The plates are straightened by Hilles & Jones machines of which there are two, one on each line of tables. The straightener tables were furnished by Treadwell Engineering Co. and are equipped with collared rollers which permit of an air space under the plates to prevent unequal cooling. Chain conveyors, built by Heyl & Patterson, are located in front of, and beyond the plate turnovers. The conveyors in front of the turnovers are used as cooling tables and those beyond as marking tables. They are of the roller-chain type, of four strands each. The two transfers in the conveyor building, of Treadwell manufacture, are of the chain pullover type, each pullover being equipped with two dogs. The first transfer is located 105 ft. 5 in. from the center of the 84-in. mill, and the second one 448 ft. 5 in. from the same point.

The two plate turnovers are unique in many respects. They are of a type patented by William Forsstrom, chief engineer Youngstown Sheet & Tube Co., and were built by the Treadwell Engineering Co. Any width of plate may be turned over and will retain its



Plan of the Plate Mill of the Youngstown Sheet & Tube Co. at East Youngstown



The Two 2000-hp. Main Mill Motors Have the Control Apparatus Located as Shown Between Them

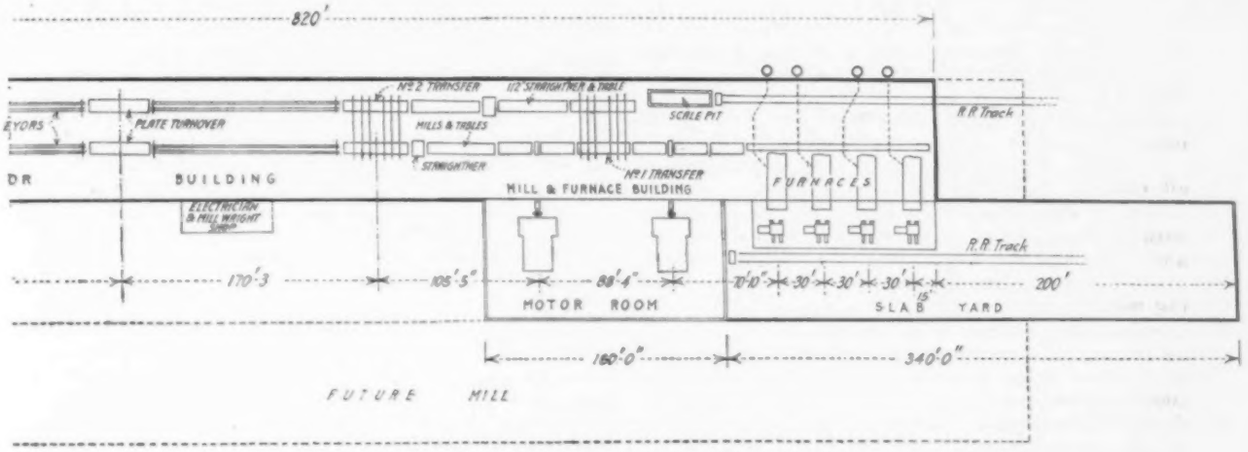
relative position on the tables, thereby eliminating pullovers. A plate may also be lifted to a position convenient for examining the under side and then returned to the table without being turned over. They are much faster than the ordinary type, due to the fact that they make one complete turning operation with the forward stroke, and one also with the return. The plate is turned by a series of forks or cradles which are located between the rollers of the turnover tables. The bottom of the fork is carried in a moving pivot which travels in a line across the table, the upper end of the forks being connected by flexible links rocking about stationary posts on each side of the table. The turning action is done by moving the pivot which carries the bottom of the fork in a direct line across the table, the travel of the upper end of the forks being restricted by the links, the fork will turn itself over in its own length, thereby turning the plate which is held therein. This mechanism is moved by rack beams actuated by pinions mounted on a common driving shaft, which is in turn driven by a 40 hp. electric motor.

The facilities for handling the finished product in the shear and shipping end are noteworthy. All parallel plates up to and including 1 in. thickness will be side trimmed on a Newbold double rotary trimming shear, already described in these columns, which is located 480 ft. from the 84-in. mill. Sixty feet beyond this is the end cut shear. The table in front of the end cut shear is provided with a straight edge to facilitate the squaring of all plates which have been side trimmed. The end cut shear is a Hilles & Jones No. 6½ gate shear, 112 in. between housings. Under the back shear table, which is a combined shear runout and scale table, is a 40-ft. double beam Fairbanks scale with lifting arms which can be raised at will to lift the plates from the table and weigh them. The plates may then be discharged by these same arms upon a plate rack located beside the table, or they may be pulled off to the castor floor. All sketch plates and plates over ¾ in. thick will be trimmed on two 146-in. Hilles & Jones gate shears, which are located one on either side of the castor floor. A Newbold circle cutting machine is provided to cut circle and radius plates. The warehouse is equipped with two additional plate scales and has three depressed shipping tracks. High speed 10-ton cranes, provided with equalizer bars on which magnets or hooks may be used, include the equipment.

The electric power for operating the mill is furnished by the main power plants and delivered by a high tension underground system to a sub-station near the plate mill. This substation is equipped with three 6600 to 240-volt General Electric motor-generator sets, for providing the power for the direct-current General Electric motors which drive the mill machinery. The 2000-hp. main mill motors are driven directly from the 6600-volt system. The control apparatus, furnished by Cutler-Hammer Mfg. Co., is contained in the motor room.

The power for the direct current motors used on the mill machinery is delivered from the sub-station to four centralized stations, in which the control apparatus is grouped. These four main leads comprise all the exposed power wiring in the plant, as all of the wiring from the control houses to the machinery and to the pulpit, is carried in underground conduits imbedded in the concrete—an important feature from the safety viewpoint. Control apparatus was supplied by the Electric Control & Mfg. Co.

A well equipped mill office and millwrights and electricians shops have been built adjacent to the mill buildings, and sanitary equipment, wash rooms and locker rooms are conveniently located. The engineering work on this installation was done, as stated, by the engineering department of the Youngstown Sheet & Tube Co.



British Steel and Tin Plate for France

The question was recently asked of the British Board of Trade whether an agreement had been reached with the French Government that all exports of iron and steel from Great Britain to France should be entrusted to the Comité des Forges; and whether that body, which consisted entirely of French manufacturers, had been granted a monopoly to buy British tin plate for French consumers to the detriment of British producers and merchants. G. J. Wardle, parliamentary secretary to the Board of Trade, replied that, owing to the shortage of steel and tin plates, only limited supplies were available for France, and the French Government was invited to set up machinery for deciding how the limited supplies could best be allotted. All exports of these goods from the United Kingdom were consigned to the body appointed by the French Government to act as a distributing channel between British producers and the consumers in France. The French Government had selected the Comité des Forges for this purpose, and while it was recognized that this arrangement had certain drawbacks, the president of the board of trade was not prepared under the circumstances to interfere with it.

That castings for agricultural implements should be classified as such for the assessment of freight charges and not as finished parts of such implements is the substance of a decision of the Interstate Commerce Commission just handed down in the case of the Dunham Co., Berea, Ohio, vs. New York Central Railroad, et al. The castings were billed by complainant as "agricultural implement castings, plain, not machine or hand finished, but painted." The commission finds that the rate of 80 cents per 100 lb. was legally applicable and not the $1.25 charged.

The Wheeling Pulverizer Co. has been organized at Wheeling, W. Va., and contemplates building a plant in that city.

Planning for Higher Corporation Taxes

Study of Manufacturers' Returns as a Guide to New Revenue Legislation —War Profits Only One Factor

WASHINGTON, June 25.—That the Ways and Means Committee is preparing to follow closely the recommendation of Secretary McAdoo that the taxation of corporations be carried to a point that will render the Liberty Bond a desirable investment is indicated by rapidly accumulating evidence. That the House will follow Mr. Kitchin's committee, regardless of the extremes to which it may go, is practically certain, and while the attitude of the Senate may be assumed to be much more conservative, the fact must be borne in mind that the conference committee representing the two houses will finally make the bill. A dozen years ago the Senate controlled revenue legislation absolutely, but in recent tariff revisions the House has played an increasingly important part, and in the framing of all internal revenue measures since 1914 the House has easily dominated the situation.

While Mr. Kitchin and his colleagues have refrained steadfastly from indicating in the course of the hearings now in progress the character of the taxing plan to be framed, and while it is undoubtedly a fact that the details of the project have not been worked out, there have been important developments concerning the views of many members of the committee and numerous significant comments have been made by them upon suggestions offered by those who have participated in the hearings. There will be general approval of Mr. Kitchin's formal announcement that the Ways and Means Committee will write a new and comprehensive revenue measure that will repeal the laws of 1916 and 1917. In this manner both corporations and individuals will be relieved of the necessity of making returns under two or three independent statutes and the work of determining prospective taxation will be greatly simplified. Under the new bill corporations will pay a flat corporate income tax, presumably at a rate substantially higher than at present, and an excess or war profits tax on a new basis yet to be devised. The effort of a number of large corporations under the leadership of the Bethlehem Steel Co. to secure the elimination of the income tax on stock dividends is believed to be doomed to failure in the House, although it is probable that the matter will be urgently pressed upon the attention of the Senate. A novel plan for floating an issue of so-called "economy" bonds by somewhat drastic methods has been presented to the committee and is receiving serious consideration.

Eight Billions from Taxes

The House committee has accepted in its entirety the Administration's plan of increasing taxation to $8,000,000,000 per annum, or one-third the prospective expenditures of the fiscal year beginning July 1 next, and the raising of the bulk of this vast sum by taxes on incomes and excess profits, by direct levies on certain articles of universal consumption and by heavy imposts on certain so-called luxuries. It is understood that the majority of the committee is opposed to reducing the exemptions for the imposition of individual income taxes, but several members are urging the propriety of cutting the exemptions of single persons to $500 and of married persons to $1,000. A very large sum could undoubtedly be obtained by these changes, and certain members of the committee are insistent that the workmen of the country who have not been obliged to go to war and who in many cases are receiving fabulous wages, far in excess of the increased cost of living, shall make a reasonable contribution to the Federal treasury. It is probable that the normal income tax rate, at least above the exemptions of the present law, will be raised, and that a new and higher scale of surtaxes on incomes above $5,000 will be adopted. The maximum rates will probably not be raised proportionately in excess of the medium rates, but incomes in excess of $1,000,000 are likely to pay very much more than 50 per cent into the Federal treasury.

Corporation Tax Returns Under Close Study

The most important task to which the House committee is addressing itself is the framing of the new excess profits tax law. The present statute will be swept away in its entirety and a new basis adopted and the managing officials of the leading corporations of the country will be interested to learn that as a preliminary step the committee is making a close study of a large number of corporate income tax returns for 1917 heretofore filed with the Commissioner of Internal Revenue. This use of these returns and the fact that the Secretary of the Treasury, at the instance of the Senate, is now engaged in compiling a list embracing considerable data of all corporations which earned 15 per cent or more on their invested capital in 1917, will indicate the purpose of the committee not only to obtain a maximum amount of revenue from the corporations but also to devise a more or less elastic statute that will fit all classes of incorporated business, leaving no loopholes for escape. It is among the possibilities that the committee will devise a provision for the imposition of so-called excess profits taxes that will embrace two or three alternative bases of assessment in order that adequate contributions can be obtained from corporations which may be divided into three classes with respect to their earnings, for, in spite of the President's desire that so-called war profits should constitute the basis for the heaviest levy by the Government, the committee is already satisfied that a strictly war profits tax would not only result in gross injustice to many corporations but would also deprive the Government of a large amount of revenue derivable under a more comprehensive statute.

War Profits Only One of Three Sources

An examination of many corporate returns for 1917 is said to show that manufacturing corporations may be roughly divided into three classes for purposes of taxation: First, those which have made heavy gains due chiefly, if not wholly, to the war; second, those which have enjoyed unusual prosperity during the past three years, but the success of which cannot be traced in any way to the war except in so far as war conditions have stimulated the commercial enterprise of the country, and third, those which during the pre-war period made large earnings that have not been increased but in some cases have actually been diminished since the United States entered the war. The committee is satisfied that no single basis can be employed in taxing these three classes. If practicable a plan would doubtless be favored levying a higher rate on the earnings of corporations of the first class than upon the others, but obviously a tax limited to war profits would obtain no contributions from corporations of the second and third classes.

An "excess" profits tax framed without regard to the source of income would secure a handsome contribution from corporations of the second class, but this basis of course would ignore those of the third class which, although making large gains, are doing no better and perhaps not so well as they did before this country became involved in the war. To meet this peculiar situation a suggestion has been offered to the committee which is under serious consideration to incorporate in the law two or three different bases of assessment,

the obligation resting upon all corporations to make a return upon the basis that would net the maximum amount of revenue. At first glance such a statute would appear to be quite as complicated as the existing excess profits tax law, but in reality it would be far simpler, provided the definitions of invested capital are clarified and the method of procedure in computing returns made simple and clear.

In adjusting the rates to be levied under these new bases the committee, according to all indications, is planning to cut heavily into corporate profits and this too irrespective of any animus that may be entertained by certain members against so-called "profiteering."

An exceedingly significant incident of the hearings now in progress has been a statement made before the committee by Dr. O. M. W. Sprague, professor of banking and finance of Harvard University, who is understood to have appeared at the request of the committee and who, while defending the big corporations against the charge of profiteering, suggested the imposition of taxes on a level with those now obtained in Great Britain. Professor Sprague maintained that "profits in many instances have just naturally increased," although in some cases "by a little manipulation and twisting" there have been further increases. "I am very certain," said he, "that no very considerable amount of profiteering is possible unless you have the favorable circumstances, and I think undoubtedly, given these favorable circumstances, profits are bound to come whether people 'profiteer' or not. For instance, I should think that a war profits tax of 80 per cent could be imposed upon the United States Steel Corporation without any animus whatever, and without implying that they have been profiteering in the slightest degree and without any real fear that the highly patriotic management of that corporation would be any less energetic and enterprising in using their organization to provide war materials."

Iron and Steel Advances Not Profiteering

When asked to account for the basis of the President's recent declaration to Congress that there has been much profiteering of which the Treasury Department has evidence, Professor Sprague expressed the view that there has probably been sufficient profiteering to provide the department with a certain amount of evidence, but that generally speaking there was a popular misapprehension on the subject. "I think," said he, "a great many people were inclined to suppose, for instance, when the price of iron and steel began to go up a year ago that it was due to some Machiavellian acts on the part of somebody. I should be rather inclined to say that it was due to forces extraneous to any particular organization engaged in that business—that the demand came, that a situation arose, and that prices naturally went up. Doubtless there are particular cases where persons have been able, by taking special advantage of a situation in special products, to squeeze a little more than they should have done or than the natural forces would have brought about."

Corporate Profits for Corporate Financing

In connection with the taxes of big corporations engaged in the manufacture of essential products like iron and steel, Professor Sprague made an interesting suggestion which attracted the attention of all members of the committee. "My own suggestion in relation to the excess profits tax on corporate income," said he, "would be that where the corporation exists and the money can be profitably retained in the business itself surplus earnings should be so retained, but that the Government should be given a lien thereon. At the present time money for manufacturing business is very difficult to obtain, which means that if you are going to enlarge you must do so usually by means of bonds. Formerly corporations used to enlarge by means of small bond issues of their subsidiaries. Now enlarging is chiefly done with profits. Whether the average corporation should be financed from profits or not is, of course, a difficult question, but probably in the present emergency in regard to new financing it would be better to allow the Steel Corporation to use its profits in making necessary extensions conditional on diverting the amount of taxes to the Government at some later season. There would be elasticity in the operation of such a law and it would do away with the almost universal objection to taxation of business men that they must have profits to go back into the business in order to finance enlargements necessary for the production of essential materials. This would put the matter more or less to a test."

"Economy" Bonds

In concluding his testimony Professor Sprague warned the committee that even if all the devices thus far discussed for the raising of revenue were employed the Government might find it impossible to secure money enough by taxation to pay one-third of the rapidly increasing cost of the war and at the same time to provide interest on the constantly recurring bond issues, not to mention the sinking fund which ought to be established to retire the war loans within a reasonable length of time. To meet a probable deficit in taxation he therefore suggested a new class of securities which he denominated "economy" bonds. As the basis for the flotation of these bonds he proposed that a special income tax of 10 per cent should be levied upon all persons above the exemption limits, the tax to be remitted, however, in the case of persons purchasing three or four times the amount of their respective special taxes in "economy" bonds. Such a system, he believed, would force the people to resort to drastic economy in order to buy these bonds, would conserve the resources of the country, and provide the Government with any necessary revenue.

Taxes on Stock Dividends

Strong arguments have been made before the Ways and Means Committee for the repeal of the existing law purporting to legalize the levying of taxes on stock dividends as income. The Supreme Court in the Towne case held the tax on stock dividends levied under the act of 1913 to be illegal, but Congress has since endeavored to legalize such an impost in the act of 1916 which was carried into the war revenue act of 1917. In a number of arguments submitted to the committee during the past week it has been contended that a stock dividend cannot be income under any circumstances for the reason that it represents merely a subdivision of the evidences of ownership and that a stockholder who receives stock in the form of a dividend is no richer than before and simply holds an increased number of pieces of paper which represent his holding in the corporation.

Judging from the attitude of several members of the committee, including the chairman, however, it seems improbable that the income tax on stock dividends will be repealed. Mr. Kitchin has frankly stated that he thinks the law should be retained and takes the position that there should be a tax on stock dividends because such a distribution of the surplus of a corporation represents money earned by the corporation in previous years which would have been taxed as income had it been divided among the stockholders when earned. This argument, he admits, would not be sound if the income tax law were taking effect this year for the first time; but as the income tax has been in force for the past five years it is now fair to assume, he contends, that many corporations have accumulated surpluses for the purpose of enabling their stockholders to avoid income tax payments. To meet this situation, he says, it is necessary to tax stock dividends.

It has also been broadly intimated by the committee during the past week that the excess profits tax on the salaries of professional men, business managers, etc., in excess of $6,000 per annum, will not be repealed, as has been strongly urged, but that in view of the objection that this is a tax that discriminates against earned incomes and in favor of unearned incomes, the committee will write into the new bill a provision suggested by Secretary McAdoo imposing an excess profits tax on all unearned incomes at a higher rate than that now levied on salaries. W. L. C.

TIN AND TIN PLATE

American Imports and Consumption of the Metal—Growth of Tin-Plate Exports

The war has made great changes in the tin and tin-plate industries. Not only has the production and exportation of tin plate by the United States gone to record figures, as have also the importations of tin, but prices for tin of all grades have gone to heights never dreamed of before.

Imports of Tin

The extent to which importations of tin have increased in recent years is shown by the following table compiled from official data:

Imports of Tin into the United States

	Total in Pounds	Per Month in Gross Tons
1917	143,687,037	4,823
1916	138,073,293	4,685
1915	115,636,332	4,062
1914	95,049,612	3,475
1913	104,282,230	3,658

These imports have increased nearly 50 per cent since 1913 and more than that since 1914. In 1918 the imports have been large, total deliveries in March and April having been 5151 and 5045 tons respectively. It is interesting to compare the change in the source of these imports as affected by war conditions. The table below is compiled from Government figures:

Sources of the Imports of Tin in Pounds

From	1917	1915	1913
United Kingdom	39,679,628	40,335,677	54,632,163
Straits Settlements	53,196,789	64,830,109	42,909,433
Dutch East Indies	31,685,517	6,687,713	.....
Hongkong	7,203,091	2,344,836	.....
Australia	5,743,924	205,274	.....
Other countries	6,178,088	1,232,723	3,312,338
Germany	.....	.....	2,879,189
Netherlands	.....	.....	549,107

It will be noted that in 1913 most of the tin came from England direct with the greater part of the rest coming from the Straits Settlements, also direct. Very little Dutch or Banca tin came in then except from Holland and no Chinese or Australian. Now the receipts from England have decidedly decreased. They were half of the total in 1913; in 1917 they were only a little more than one-quarter of the total. More is now coming direct from the Straits Settlements and the Dutch East Indies as shown by the above figures, the latter having furnished nearly one-fifth of the total last year as compared with none in 1913. The importance of Chinese tin and its more extended use is demonstrated by the receipts of over 7,000,000 lb. in 1917 as against none in 1913. The table also shows the growing importance of Australia as a source of tin.

An interesting comparison in values is the fact that the 75,229,656 lb. imported in the seven months ended March 31, 1916, were valued at $25,302,686, whereas the only slightly larger amount, 76,207,472 lb. imported in the same seven months ended March 31, 1918, were valued at $38,001,289. The value of the 1900 tin imports was $19,000,000; in 1917 they had grown to $68,000,000 in value or from 70,000,000 lb. to nearly 144,000,000 lb.

Exports of Tin Plate

Of chief interest and importance, outside of the metal itself, is the tin-plate situation. This industry has made rapid strides in the United States since the war started, while in Great Britain there has been a corresponding decline. As judged by exports of tin plate the industry in the United States has increased fourfold, while in Great Britain it has declined nearly 66 per cent. The following table gives the comparative exports of tin plate from the United States and Great Britain for the last five years and illustrates this marked contrast:

Exports of Tin Plate from the United States and Great Britain in Gross Tons

Year	From the United States	From Great Britain
1917	233,301	177,218
1916	227,391	321,654
1915	154,641	368,602
1914	59,548	435,392
1913	57,812	494,497

While the tin-plate export trade of the United States has increased 400 per cent in five years, it is not greatly in excess of the present decidedly diminished British export trade and is even now less than 50 per cent of what the British outgo was in 1913 when it was more than 800 per cent of that of the United States.

It is interesting to note that while the British exports in 1913 went to 15 different destinations, those for the United States in 1913 went to only 9, which was increased in 1917 to 16 different foreign consuming points. The greatest recipient of the 1913 British exports was British East India, with 68,817 gross tons, the Netherlands coming next with 43,009 tons and Germany third with 34,739 tons. The bulk of the American 1913 exports went to Canada, Great Britain being credited with only 9889 tons to that country. In 1917 the United States sent 59,222 tons to Canada, the largest amount to any country last year. The Argentine Republic ranked second in 1917, receiving 28,519 tons from the United States; Great Britain in 1913 sent 19,323 tons to that country. While the exports to Japan from the United States in 1917 ranked third with 21,869 tons, they were less than the British exports to Japan in 1913 of 28,222 tons. In general the United States has supplanted Great Britain in the tin-plate export trade, though at a reduced relative volume.

Consumption of Tin in the United States

The industry in the United States which consumes the largest amount of tin is of course the tin and terne plate. The solder and bearing-metal industry also take large quantities. According to a statement compiled by the War Industries Board from returns obtained through the sub-committee on pig tin, the consumption of pig tin for different purposes in 1917 was as follows in gross tons:

Tin Consumption in the United States in 1917

Tin and terne plate	27,600
Solder	17,000
Babbitt and other bearing metals	10,800
Brass and bronze	4,800
Foil	4,000
Collapsible tubes	2,100
White metal	1,764
Miscellaneous	8,193
Total	76,257

The item "miscellaneous" has been subdivided as follows: Galvanizing, 105 tons; tinning and retinning wire, utensils for food purposes, carriage and harness hardware, etc., 1916 tons; partly for tinning and retinning and partly for other uses, 595 tons; bells, 15½ tons; pipes (tubes), 276 tons; partly for pipes and partly for other uses, 620 tons; rubber, 126 tons; type metal, 35 tons; bullets, 65 tons; plated ware, Britannia ware, etc., 1002 tons; chemicals, 1718 tons, and not specified, 900 tons.

Besides the imports of tin, there is a considerable quantity produced by the American Smelting & Refining Co. in New Jersey from imported Bolivian ores, estimated by some authorities at 500 to 600 tons per month. The tin recovered by re-tinning plants from tin cans and scrap is also considerable—estimated at about 17,000 tons in 1917.

Those contemplating using female labor in the Pittsburgh district are supplied by the Employers Association of that city with blanks calculated to give information to help in the movement. The intending employer has to describe housing conditions surrounding his plant and the prices charged for a room and board, and he has to indicate if he has a lunch room, toilets and rest rooms, a matron, a welfare department, a physician and a hospital. He also has to give specifications as to the machines to be operated and among other things the basis of wage payments.

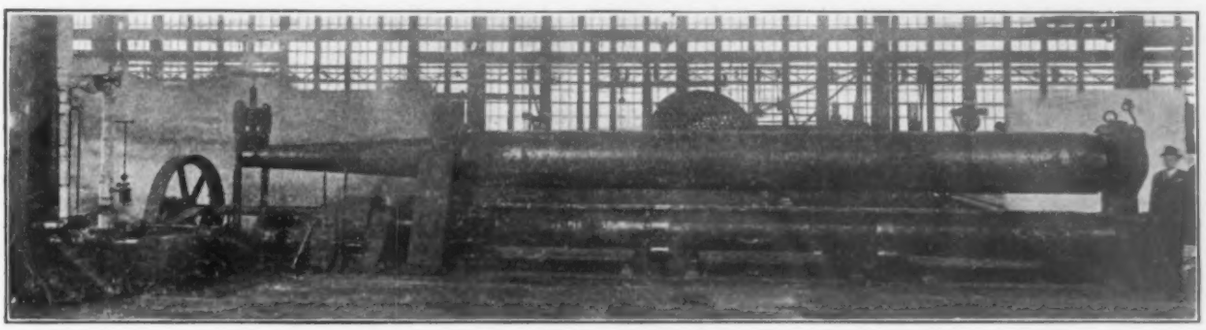
The Crawford Machine Tool Co., Inc., has been formed to take over the business and assets of the Joseph Crawford, Jr., Co., dealer in metal working machinery. The new company will be conducted by the same interests and without any substantial change of policy. Joseph Crawford, Jr., is president and Alexander Chessin secretary and treasurer. An office will be maintained at Erie, Pa., as well as a sales office at 21 Park Row, New York.

A New Motor-Driven 12-In. Engine Lathe

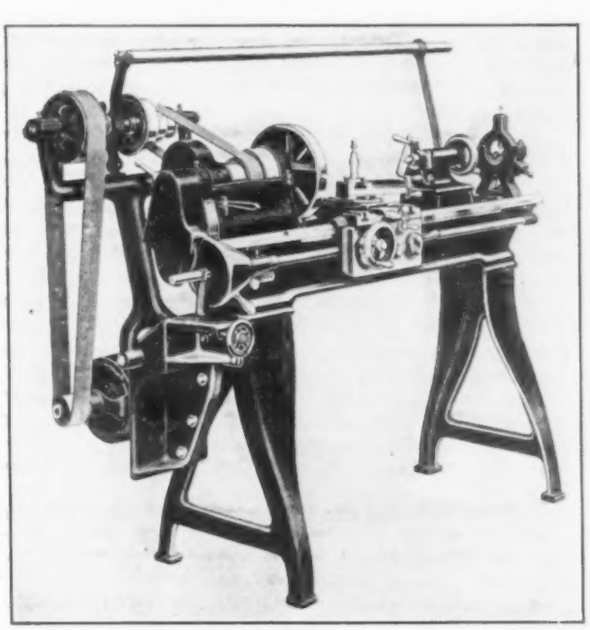
Several new types of lathes have been added to the line built by the Shepard Lathe Co., Cincinnati. Among these are a cone head lathe equipped for individual motor drive which is illustrated, as well as one in which the driving motor is mounted on the headstock and other types in which the single-pulley and countershaft belt drives are used. The advantages claimed for the driving arrangement shown are the combination of the driving motor and the lathe in a single unit, while at the same time the additional weight of the motor is supported near the floor and the proper belt tension is secured by a screw and handwheel combination controlling the position of the swinging arm on which the countershaft is supported. A semi-quick change attachment provided eliminates separate change gears and a reversing lever in the headstock enables the different feeds of the lathe to be reversed without stopping the machine, shifting the belts or changing the direction of lathe rotation.

A positive seven-jaw steel clutch provides for six spindle speeds, ranging from 32 to 502 r.p.m. These changes are secured by two conveniently located levers on the headstock. The spindle, which is hollow, has a 1-in. hole that permits of the use of a draw-in attachment and collets and runs in phosphor bronze bearings. The feed reversing mechanism is operated by a positive clutch which permits the lead screw nut to remain in engagement when changing threads, thus making it unnecessary to reverse the belts or watch the dial, an arrangement which is relied upon to increase the speed of production as well as simplifying the operation.

The carriage has large bearings on the bed, and the compound rest which is gibbed and graduated also has a large bearing surface to provide rigidity for the cutting tool. The tailstock is of the offset type with a set-off for turning tapers. Milling, taper, turret and draw-in attachments, as well as transposition gears to enable metric threads to be cut can be supplied as extras.



Steel Plates 1½ In. Thick Can Be Bent to a Diameter of 48 In. by a Large Set of Pyramid Type Rolls Driven by a 100-Hp. Steam Engine



The Use of a Swinging Arm to Support the Countershaft of a New 12-In. Quick Change Screw Cutting Engine Lathe Enables the Driving Motor to Be Mounted near the Floor and Proper Belt Tension to Be Secured

A Heavy Plate Bending Roll

A new plate bending roll which is said to be the largest and heaviest machine of its kind in any boiler manufacturing plant in the United States, has recently been installed in the plant of the D. Connelly Boiler Co., Cleveland. It was built by Wickes Bros., Saginaw, Mich., and is driven by a 100-hp. engine through steel reduction gears.

The machine is 43 ft. long overall and has a capacity to bend a steel plate 1½ in. thick and extending the full distance between the housings to a diameter of 48 in. It is of the pyramid type, having two lower rolls each 20 in. in diameter and one upper roll 31½ in. in diameter. The rolls are hammered and machined forgings, the top one weighing 80,000 lb. The total weight of the machine is 250,000 lb. The machine is fitted with a drop end housing so that a plate can be bent to form a complete circle, and by lowering the drop end housing the finished circle can be removed from the top roll.

New Company Buys Unsold Milliken Assets

The Milliken Brothers Mfg. Co. has been incorporated with a capital stock of 3000 shares of no par value, to take over the name, good-will, patents covering steel building construction, and all other intangible assets of Milliken Bros., Inc., which was specifically reserved when the latter company disposed of its steel fabricating plant at Arlington, Staten Island, N. Y., to the Downey Shipbuilding Corporation, July 19,1917. The incorporators and officers of the new corporation are C. T. Clack, who was for a number of years works manager of Milliken Bros., Inc., president; J. E. Jennings, for 20 years chief engineer for its transmission tower department, vice-president and secretary; Robert Grant, iron and steel merchant, Woolworth Building, New York, treasurer. The headquarters of the new company are at 99 Nassau Street, New York. Arrangements are being made for the establishment of a fabricating plant in the metropolitan district.

The new organization will specialize in the construction of transmission towers and other light bolted steel structures, more particularly that of sheds and storage buildings designed according to a multiple truss unit patented by Mr. Jennings and so designed that the unit is usable for either column or truss work permitting a building of flexible design both as to height and width. It is now constructing about 200 such buildings of a total length of 32,000 ft., 40 ft. wide, for the shell and shrapnel loading plant of the Atlantic Loading Co. at Hammonton, N. J.

The Bessemer & Lake Erie Railroad, operated by the Carnegie Steel Co., Pittsburgh, will make large additions to its shops at Greenville, Pa.

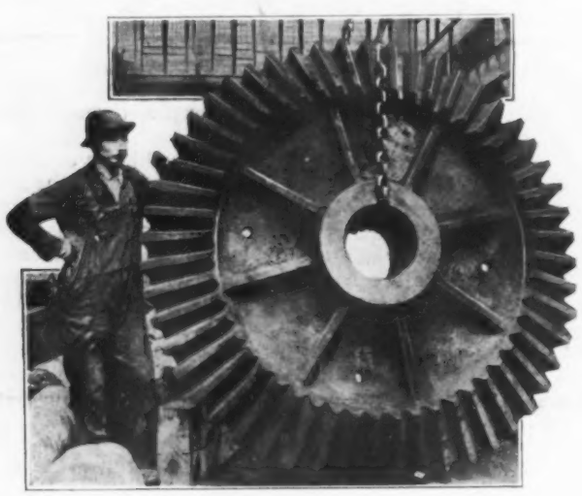
Steels for Gears and Their Treatment*

Materials Available and Uses—Character of Heat Treatment—Case vs. Oil-Hardened—Cast-Steel Gears

BY GEORGE A. RICHARDSON

MODERN developments in gear practice and design, and in the manufacture of special steels have been very rapid in a period of comparatively few years and cannot be laid to any one cause. Improvements in the internal combustion engine, which not only gave the first big impulse to automobile manufacture and made the airplane a practicality, but introduced a new form of motive power, have undoubtedly been a big contributing factor. Primarily uni-directional and limited to a more or less selective range of speeds so far as efficient operation is concerned, means must be provided for securing a wider range of operating speed and change of direction.

So far, systems of gears have proved the most satisfactory means for accomplishing this object. The automobile introduced the demand for gears of maximum



A Nickel-Chrome Cast Steel Gear Over 7 Ft. in Diameter Used by Midvale Steel & Ordnance Co.

lightness and strength, capable of standing unusual wear and abuse. Marked changes in the type of equipment used in machine shop practice together with increasingly heavy working requirements have necessitated radical revisions in the design and specification of gears. The steam turbine, unusually efficient at constant speed, depends upon gearing systems to adapt it to uses where variable speeds are a requisite. Modern electric railroad operation, hydroelectric plants and similar installations, all have their specialized needs which are being more fully appreciated every day. Thus we have a number of varying operating conditions to take into consideration in determining upon the material that we desire to use for our gear system in any given case.

Classification of Gears

In the last analysis the question of the grade of material best suited for a given gear or system of gearing comes down to several basic considerations. We may roughly divide all gears into two classes:

Gears which are primarily used merely for the purpose of changing speeds.

Gears which are primarily for the purpose of conveying power and must withstand the severe service conditions which are necessary.

In one case the cheapest material consistent with convenience is the best; in the other the best material is cheapest. Granting that the gears are to be used to convey power, it becomes necessary to consider:

Whether resistance to wear is the most important requirement.

Whether the resistance which the gear will offer to shock or sudden and excessive loads is of importance.

When resistance to wear is the most important consideration the general opinion is that case-hardened material will prove more satisfactory than oil-hardened, although there is a considerable amount of evidence to the contrary. Case-hardened material, however, has too brittle a surface and lacks the strength and toughness necessary to withstand the impact of shocks or heavy and excessive loads. Hence an oil-hardened gear will give better service under these conditions.

Discussing the materials available, the uses to which they are best adapted and the character of heat-treatment involved, it was formerly believed that superior results could be obtained in gear trains by using varying grades of material in the different gears, the idea being that those gears which tended to wear out fastest should be made of harder or better material. Granted that this were the case it would be advisable to consider the materials not only by themselves but in their relationship to each other. The problem of choosing varying compositions to decrease wear has been experimented with very thoroughly, however, and while results were obtained at one time that appeared to support this belief they have since been contradicted and it has been conclusively proved that there is nothing in it when gears are operating under the same service conditions.

Gears of Cast Steel

Cast iron is a better material for gears than cast steel in many cases, these depending on whether or not the desired strength can be obtained without taking into consideration the weight. Cast-iron gears are easier to mold, come out cleaner and require less machining than cast-steel gears. In many places there is no question that cast iron will give perfectly satisfactory results, and where conditions are such nothing better is warranted.

Almost all heavy gears for high, severe service are made of cast steel of either the straight carbon or alloy types. Small-sized steel gears may be cast within certain limitations. At our own plant gears weighing 50 lb. and having a diameter of about 12 in. represent the smallest that we attempt to cast. Small specialty shops can cast small gears of steel very successfully.

For quantity production, however, drop forgings are preferable from every standpoint. They are cheaper to make, more uniform and, for this last reason, stand up better in service. In general, therefore, it may be said that small cast-steel gears are a commercial proposition only in so far as the number required is too small to warrant the making of special dies. An ordinary grade of straight carbon steel is used as a rule. Alloy steel could be used, but it is more difficult to cast and for this reason not favored in the small size work. Cast-steel gears of small size may or may not be machined before using. Where accuracy is desired, they must be machined.

Large cast gears are sometimes machined, but more frequently not. Molded teeth will usually prove satisfactory due to the fact that less accuracy and freedom from noise are required. In any event the operating speeds of large gears are very likely to be such that

*From a paper presented at the annual meeting of the American Drop Forge Association at Buffalo, June 20. The author is with the Midvale Steel & Ordnance Co., Philadelphia.

there is not the chance for making much noise such as exists in the case of small gears operating at high speed. Generally speaking, the small specialty gears have no heat treatment or at best are simply annealed. Large gears are generally annealed.

Gears of Large Size

For especially severe service large size gears have been manufactured with great success by using a nickel-chrome composition and air-hardening. Such gears outwear three ordinary cast-steel gears, which makes them valuable not so much because of the lasting quality itself but because of the fact that less breakdowns of equipment are experienced.

An excellent example of a large gear of this type can be found in our own shops. It is shown in the illustrations. This gear is used as one of those in our tire mills and is 86 3/16 in. (more than 7 ft.) in diameter and weighs 13,350 lb. It is cast from an air-hardening nickel-chrome steel, the type composition of which runs, carbon 0.425 to 0.450; nickel, 4 to 4.50; chromium, 1.25 to 1.50. We have used these gears with and without machining the teeth, but the latter is preferred because it is better for the mill, due to the lessening of the vibration. Two annealings, one at about 1475 deg. and one at 1200 deg., are given before machining. The gears are then air-hardened from a temperature of about 1550 deg.

As to the comparative life of cast-steel gears and cast-iron gears, we have found that the large, treated alloy gears will double or triple the wear of treated cast-iron gears. Ordinary cast iron will not stand up at all and ordinary cast steel, while it will stand up, will not do as well as the specially-treated cast iron. Gears in this service have been experimented with, using both molded and cut teeth, and the relations hold either way.

Ordinary Machinery Steel Gears

The great majority of gears are made from ordinary straight carbon machinery steel and give perfect satisfaction where they are maintained in constant mesh. The machine design must be such that the gear wear is comparable to the life of the machine. There are some cases where, due possibly to defective design, one gear will wear out more quickly than any other in the train. Oftentimes the substitution of one alloy gear for the gear which is defective will save the whole train.

Ordinary machinery steel gears are very largely used in the soft condition without treatment of any kind. Where the wear conditions are severe and long service is called for, the gear will be case-hardened. An oil treatment is good for any gear. The general trend in common gears at the present time seems to be in the direction of a design adapted to a higher quality of steel than has hitherto been used.

Alloy Steels for Gears

In alloy steels there are two general classifications to consider—case-hardening and oil-hardening. The uses for which the two classes are best adapted are clearly defined in some cases. There are many applications, however, where the decision as to which will be used is governed by preference or prejudice.

Plain carbon steel is used quite extensively in the case-hardened form, but not for the more severe kinds of service, because the core is very low in tensile strength. With a carbon content running from 0.10 o 0.20 per cent, 80,000 lb. per sq. in. represents a good average value, which may attain 90,000 lb. when the carbon content is a maximum. Not only is the tensile strength low but the case is much more likely to chip off under heavy service than where alloy steels are used. The alloys in most general use are:

Nickel of 3.5 to 5 per cent.

Low grade nickel chrome. This steel has a type composition nickel 1.5 per cent; chromium, 0.5 per cent. Carbon as desired. Other names for this grade are Mayari or natural alloy steel.

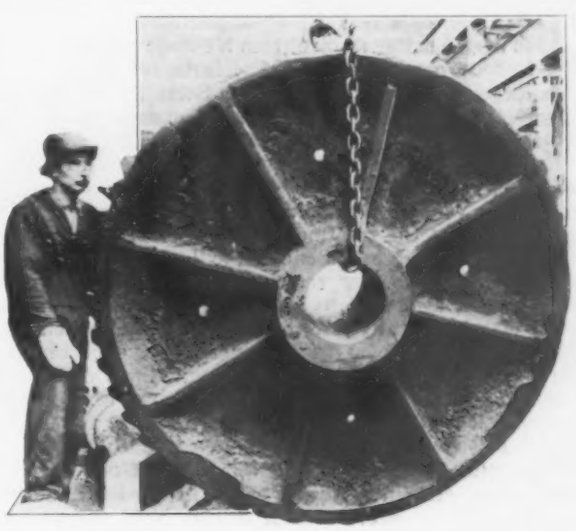
Chrome nickels with the type composition carbon 0.15 per cent, chromium 1.50 per cent, nickel 3.5 per cent, and type composition, carbon 0.15 per cent, nickel 3 per cent, chromium not less than 0.60 per cent.

Chrome-vanadium steels.

All of these alloys are used and all are good, depending on the service. The natural alloy, otherwise known as Mayari, is the cheapest and least reliable. The nickels are very good, especially the higher nickels running up to 4 to 5 per cent nickel. Chrome-nickels give excellent results. Chrome-Vanadium compositions are probably more successful for case-hardening purposes than oil-hardening.

An important point to bear in mind is that the lower the quenching temperature that can be used to get an effective hardness the better the result. This takes into consideration warpage, and also applies with equal force to the oil-hardening and the case-hardening types. Of the alloy types mentioned, the higher nickels can be successfully hardened at the lower temperatures. Chrome-nickel steels require a somewhat higher hardening temperature, which however decreases as the nickel content increases. Chrome-vanadiums require the highest quench of all. For case-hardening it is not well to go above 0.20 per cent carbon in any of the above.

All of the alloys are more difficult to machine than straight carbon steel. In fact it may be said that it is quite probable that machineability is a criterion, in inverse ratio, of the value of a steel for gears. Wearing qualities and machineability are to a certain extent inter-related, both being functions of toughness as well as hardness. Where there is hardness without toughness



The Cope Side of the Large Cast Steel Nickel-Chrome Gear Shown on Opposite Page. It is heat-treated before using

the wearing qualities are less and material is easier to machine. Another point to be considered is that the low carbon case-hardening grades in any of the alloys are easier to machine than the higher carbon oil-hardening grades. This is one of the reasons why case-hardening steels are sometimes favored. The greater ease with which they can be machined reduces the cost.

From a forging standpoint, all the alloys will stand drop-forging at high temperatures. The ordinary carbon steel is the most readily forged of all and will stand a high forging heat better.

Heat Treatment

The forging operation not only works the steel but it is also a heat treatment in itself. In fact it may be said that every steel has been heat-treated; that there is no such thing as a non-heat-treated steel, the temperature at which the steel is finished being the temperature of the heat treatment, regardless of whether the piece is a casting, forging, etc. The value of the alloys in steel is quite largely due to the fact that they make steel more sensitive to heat treatment. The higher the forging temperature, the poorer is the heat treatment due to the forging. Forge treatment is necessarily lacking in uniformity under the best of conditions, and for this reason is almost never good.

With the non-sensitive steels this poor heat treatment is not a serious consideration, but where sensitive steels are involved it may put them in such condi-

tion as to make them absolutely unfit for service. In any case the harm done will require subsequent corrective treatments which are more or less profound according to the severity of the forging treatment, *i.e.*, the finishing temperature of the steel at which the steel leaves the forge.

The alloy steels will stand a forging temperature of as high as 2200 deg. Fahr., but they must be finished at a low temperature, the finishing temperature being increasingly important, the higher the grade of the steel. In case-hardening gears it is always advisable to case-harden at as low a temperature as the production department will stand for.

Treatment After Carburizing

The treatments that are advisable after the carburizing operation are variable. With plain carbon case-hardening steels it is very often possible to get sufficiently good results by a single quench direct from the carburizing operation. This is admittedly poor practice. It is much better to cool slowly from the carburizing temperature and then re-heat for hardening. This is especially true if the carburizing temperature is high. With a low carburizing temperature, under 1600 deg. Fahr., it is quite possible to get by successfully with a single quench in the subsequent hardening.

In the case of the sensitive steels, which include all the best grades, it is almost an absolute necessity to cool slowly from the carburizing temperature and re-heat, and it is still better to give them a double quench. With the highest grades it is impossible to secure the best results without a double quench. Some firms consider it advisable to draw the temper after quenching, but we do not agree with this. We believe it is far better to choose the alloy for a given purpose, which can readily be done.

In the very best practice the resulting core tensile strength from the treatments will probably be highest in the case of the chrome-nickels, and approximate 200,000 to 225,000 lb. per sq. in. Chrome-vanadium and high nickel compositions will approach this strength quite closely. In any case the higher the carbon content of any of the alloys the higher the range of tensile strength and elastic limits. The elastic limit will more nearly approach the tensile strength in the case of the chrome-nickels than either the chrome-vanadiums or nickel steels.

In using case-hardening steels it must not be forgotten that certain parts are not to be hardened and it is necessary to protect them during the carburizing process. Copper-plating seems to be the most effectual method of accomplishing this.

The hardness of case-hardened teeth will run about the same, regardless of the material used, but the alloys combine toughness with the hardness so that the teeth will stand harder usage.

Oil-Hardening Steels

Alloy steels that are available for oil-hardening include the following:

Straight nickel steels in the higher carbon contents; 3.50 per cent nickel is the most generally used for oil-hardening. It is probable that no 5 per cent nickel is used for this purpose in this country.

The various chrome-nickels in the higher carbons.

Chrome-vanadium compositions.

Other alloys containing combinations of tungsten with or without nickel, chromium, vanadium, etc., have been experimented with but have never come into general service.

The heat treatments necessary vary according to the sensitiveness of the materials, the more sensitive, such as nickel-chrome compositions, absolutely requiring a double treatment. The first requirement is a preliminary treatment, which may be a quench or an anneal, to break down the crystallization set up during forging and bring the steel to a uniform cell size though not a thorough grain refinement.

In addition to the above it has been found desirable in the case of some alloys to give them a quench from the forging temperature, in order to improve the condition of the steel, which is apt to be pretty poor. The forgings are taken directly from the forge and dipped into oil or water until they become black but not cold and are then buried in ashes. This is a treatment of the cheapest kind and interferes with production only in so far as the necessity for storage space is concerned. The final treatment is for the purpose of producing as nearly perfect grain refinement as is commercially possible. It should be given at the lowest temperature that can be used and still give hardness. As in the case of the case-hardening steels, the relative order for hardening temperatures is as follows:

Nickel steels can be successfully hardened at the lowest temperatures. Then come the chrome-nickels, which have a higher treating temperature, which, however, decreases and approaches those of the nickel steels as the nickel content increases. The chrome-vanadiums require the highest temperatures of all and while they will give results that are good the high-treating temperature required is very apt to cause increased trouble from warpage and deformation. The temperature for the final treatment must be above the critical temperature of the steel.

Case-Hardened vs. Oil-Hardened Gears

As to the relative merits of case-hardening and oil-hardening compositions, in certain kinds of service the case-hardened gears are undoubtedly superior, while in others the oil-hardened are best. As a general rule the oil-hardened gear can be counted on for steady uniform wear. Where a case-hardened gear is used, the wearing down of the case to the core at any point means that the gear is gone. Similarly, if the case cracks it will flake, and the gear is gone. The actual cost of case-hardening will usually run slightly greater than that of oil-hardening.

Oil-hardened gears always give a lower scleroscope hardness than case-hardened gears, but this is not a criterion of wearing quality, as the toughness of the material always enters in. For certain classes of service in certain gear design in automobile work, chrome-nickel oil-hardened gears, having a scleroscopic hardness of 70 to 75, have been found to give absolutely satisfactory results, while in others 65 to 70 has proved better. The design is a very important factor in all cases.

It is certain that there is a marked improvement going on in methods of gear design and types of material used. The use of the better grades of material will be found warranted in many cases where the cheaper grades are now used. Two random examples of actual results obtained in our own works, examples which represent two extremes, are mentioned herewith as indicative of what may be looked for.

The first has to do with milling machines. In certain types two of the gears always gave trouble. By replacing these gears with others of chrome-nickel steel, properly hardened and drawn, we have been able to forget that they were there.

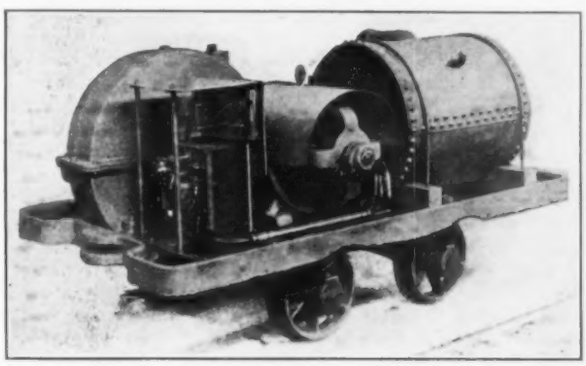
The second has to do with a piece of laboratory equipment, namely, a potentiometer, a small, delicate bit of machinery. As originally furnished, difficulty was experienced by the wearing out of the carbon steel worm which occurred every few months. Just how this was originally treated we do not know, but the replacement of it with a chrome-nickel worm obviated the trouble entirely and we have not had one wear out in four years' time.

In determining the best treatment to give gears there is one very important rule to bear in mind, that experiments should be made, using samples of the material of the same size and general shape as the finished gear. Small test pieces do not give conclusive evidence, although they are very useful. The selection of a steel for a gear is not a matter of snap judgment but rather of careful study of all the conditions to be met with.

If everything runs according to schedule, the first heat will be taken June 25 from one of the four new 90-ton open-hearth furnaces of the Mark Mfg. Co., Indiana Harbor, Ind. Gas is on in two of the three remaining furnaces. The 600-ton blast furnace of the company is expected to go in blast late in July or about Aug. 1.

Portable Motor-Driven Air Compressor

A small portable compressor which can be supplied in several sizes up to a maximum capacity of 415 cu. ft. of air per min. and a maximum pressure of 100 lb., has been developed by the Ingersoll-Rand Co., 11 Broadway, New York. It is intended for use either as an auxiliary to the main compressed air system or for development work where a permanent compressed air line has not been installed. The compressor was designed primarily for mine work, and for supplying air to pneumatic drills, coal cutting machines, air hoists,



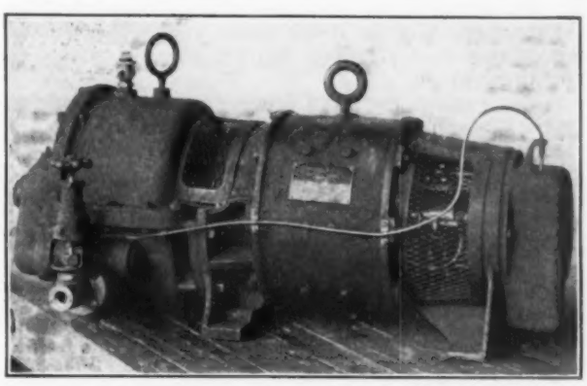
Compressed Air for Operating Pneumatic Tools Can Be Supplied by a Portable Motor-Driven Air Compressor, Which Serves Either as An Auxiliary to or a Substitute for a Compressed Air System

etc., but can, of course, be used wherever compressed air is required for the operation of any tools.

The compressor is mounted on a truck with flanged wheels, the gage being the same as a mine track and can thus be hauled wherever needed. A large air receiver into which the air is pumped, thus enabling a constant pressure to be maintained, forms a part of the outfit. The motor used was built by the Westinghouse Electric & Mfg. Co. It can be furnished in sizes ranging from 12 to 56 hp. according to the size of the compressor and is wound to conform to voltage and character of the available sources of power.

A 10-Kw. Lighting Turbo-Generator Unit

The Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has recently brought out a small turbo-generator unit for direct-current service. The capacity of the unit is 10 kw., although a temporary overload of 25 per cent can be carried. The generator may be put on steam locomotive cranes to supply the current for the lifting magnets, and is also for use in flood light-



A 10-Kw. Direct-Current Turbo-Generator Unit for Supplying Current for Flood Lighting and the Lifting Magnets of Steam Cranes Is Equipped with a Hand and Automatic Throttle Valve and an Emergency Governor to Prevent Overspeeding

ing for night work or for the protection of industrial establishments. A hand and automatic throttle valve and an emergency overspeed governor are provided.

Plan to Standardize Wages on War Work

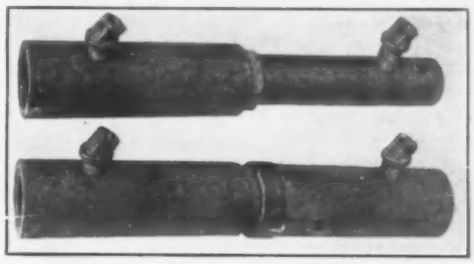
WASHINGTON, June 25.—An ambitious undertaking, having for its object the stabilizing and standardizing of wage scales throughout so-called war industries, has been launched by the War Labor Policies Board of the Department of Labor. This board is made up of representatives of the executive departments, the Shipping Board, War Industries Board, and Food, Fuel and Railroad administrations. The project to be undertaken is embraced in the following declaration adopted by the board:

> The recent uncoordinated activities of Government contractors in the matter of hiring labor for war industry have resulted in competitive bidding by one contractor against another for the available labor at any scale deemed expedient for the occasion which has resulted in producing restlessness and wasteful movement of labor from one industry to another;
>
> It is absolutely essential to the stabilization of industry throughout the United States that all wages for both skilled and unskilled labor engaged in war work be standardized. Therefore be it
>
> Resolved, that wages paid by Government departments and contractors engaged in war work should, after conference with representatives of labor and by industrial management, be stabilized by this board; that the Committee on Standardization is hereby instructed to proceed with its work with all possible expedition and that as soon as such standardized scales are established the full influence and authority of all departments of the Government represented on this board will be exercised to maintain them.

Chairman Felix Frankfurter of the War Labor Policies Board declines to go into details as to the methods to be pursued in standardizing wage scales, but states that as soon as the work of the special committee having charge of the matter has been completed the public will be fully advised.

Protecting Soot Cleaner Elements

To prevent the steel elements of its soot cleaner from becoming inoperative as a result of the high temperatures to which they are exposed when permanently installed in a boiler, the Vulcan Soot Cleaner Co.,



A Loosely Fitting Cast-Iron Sheath Is Slipped around the Inner Steel Pipe of a Soot Cleaner Element to Protect the Latter from the Ill Effects of the High Temperatures Encountered in Furnace Operation

Du Bois, Pa., has adopted a method of protecting them. This arrangement has as its foundation the fact that steel when heated to a temperature of 1000 deg. Fahr. is liable to sag from its own weight.

To guard against warping the steel inner pipe is incased in a loosely fitting heavy cast-iron sheet. This arrangement is brought out in the accompanying illustration, which shows two of the elements, the lower one with the sheath in place and the other with the sheath removed exposing the inner steel tube. This element is intended for use in a horizontal tube boiler and the ararngement of the nozzles for blowing down obliquely is also brought out.

A similar non-warping element is made for vertical tube boilers, the only difference being that here the nozzles are at right angles to the element and not oblique. In this case the element is placed between the circulating tubes above the first pass of the boiler where the tube arrangement is such that the nozzles discharge at right angles to the element.

ECONOMIES IN USE OF TIN

Savings Found in Babbitt Manufacture, Other Alloy Castings and in Solder

WASHINGTON, June 25.—A series of suggestions for the conservation of tin in the manufacture of babbitt and other bearing metals, solder, and tin alloy castings is about to be promulgated by the Tin Section of the War Industries Board. These suggestions are based upon experiments made by the Bureau of Standards and by various large manufacturers and consumers. In bringing them to the attention of all interested manufacturers and consumers, the Tin Section is issuing a statement in part as follows:

Experiments to Find Economies

"On account of the limited supply of tin available in the world to-day and because of the hazard involved in connection with our oversea imports upon which we depend for our requirements, and furthermore, because our war program calls for a very large tonnage of tin, it is imperative that we take immediate steps to husband our resources: First, by eliminating all waste; second, by substituting other metals wherever practicable; third, by reducing the percentage of tin used in various alloys just as far as possible, and finally, by recovering larger quantities.

"The War Industries Board has conferred recently with representative manufacturers of babbitt and other bearing metals, solder and miscellaneous tin-alloy products for the purpose of explaining the present situation, and in order to obtain suggestions as to the most practicable methods for conserving tin. In cooperation with the Bureau of Standards, a number of experiments have been conducted. . . .

"The accompanying statement reports some of the findings of the Bureau of Standards resulting from their experiments and from inquiries made among a number of large manufacturers and consumers. We realize that these suggestions cover only a few means of reducing our consumption of tin. The War Industries Board will gladly welcome others, particularly as it is expected that each recipient will be influenced in his approach to the problem by consideration of the special needs of his own line of products and manufacturing equipment. It is hoped that the very widest possible use will be permitted of any original findings that may result from a careful study of the problem."

The suggestions for conservation of tin above referred to are as follows:

Babbitt and Other Bearing Metals

Many specifications for bearing metals now in existence call for virgin tin (Banca or Straits). A large saving of these high grades of tin could be brought about by allowing the use of second quality pig tin in making tin-base babbitt. Detrimental impurities could still be limited but lead could be allowed to a maximum of 1 per cent. This would not be harmful in any way to a tin base or lead-base lining metal.

There is no question but that the tin content can be reduced somewhat in all bearing alloys. In a few cases, such as for airplanes, crankshaft bearings, etc., it may not be feasible to reduce the tin content by any but a small percentage, whereas in other cases it can be cut down very considerably. In the present emergency every possible saving, however small, should be effected.

For those cases where genuine babbitt is now used and which requires a very high grade of lining, alloys such as the following are suggested:

	No. 1, Per Cent	No. 2, Per Cent	No. 3, Per Cent	No. 4, Per Cent
Tin	85	84	65	62
Antimony	10	8	..	..
Copper	5	8	3 to 6	4
Zinc	..	..	28 to 30	33
Aluminum	..	..	..	1

One large bearing metal manufacturing concern states that the tin should be reduced in favor of lead. Lead-base linings can be used in many cases where tin-base linings are now used, and in general are just as satisfactory. Many manufacturers already use the lead-base metals, but their use could be made more universal. Several special types of lead-base linings, hardened with alkali or alkali earth, are reported to be giving very satisfactory service in the place of high tin babbitt.

One firm states that it is using the following composition instead of Nos. 2 and 3 above in order to conserve tin:

Substitute 2	Per Cent	Substitute 3	Per Cent
Tin	8	Tin	5
Antimony	8	Antimony	7
Copper	4	Copper	2
Lead	80	Lead	10
		Zinc	76

These have apparently been found to do the service required of the tin-base linings in machine tool work.

Another large manufacturer of machine tools does not use lined bearings at all, believing that bronze alone is sufficient. There is probably no question, however, but what the lined bearing is cheaper because of the less amount of machining necessary in making the bearing. It is also claimed that the cost of replacement of a lined bearing is less than that of a bronze bearing and has to be made less frequent. One way in which a lining metal can be saved is to use just as thin a lining as it is possible to have in order to maintain a high enough temperature during pouring to ensure a firm bond and solid mass of metal.

In place of a bronze used for bearings containing 80 per cent copper, 10 per cent tin and 10 per cent lead, the following might be substituted as having been thoroughly tried and found satisfactory:

	No. 5, Per Cent	No. 6, Per Cent	No. 7, Per Cent	No. 8, Per Cent	No. 9, Per Cent	No. 10, Per Cent
Copper	81	79	74	64	*	*
Tin	7	5	5	5	8	5
Lead	9	15	20	25	15	17½
Zinc	3	..	..	..	1½ to 3	5
Antimony	..	..	..	5	..	..
Phosphor copper	1	1	1	1	..	..

*Remainder.

With the co-operation of all in consideration of the above suggestions, it seems probable that much less tin could be used in bearing metals without in any way impairing their service. It is believed that a saving of at least 25 per cent could be brought about by a judicial selection of the proper composition of either bronze or lining to use for each particular service and insisting upon its use.

Solder

There is apparently very little excuse for using a 50-50 solder or higher tin solder for any purpose whatever except in the matter of appearance of the finished article, and in the present emergency this is of secondary importance.

For hand soldering with an iron 45-55 will answer for all purposes but for most purposes 40-60 will be satisfactory. Wiping solder used by plumbers should not contain over 37½ per cent tin, whereas many are now using 40-60.

Can manufacturers and canners by adopting proper machinery can use 37½-62½ solder with satisfactory results. Very little solder of a higher tin content need be used in these industries.

Manufacturers of radiators need not use solder above 40-60 and in a majority of cases 35-65 will be found entirely satisfactory, and often lower tin content can be used, providing the solder is kept free from antimony. The use of pure tin in radiator construction appears extravagant. If this is used merely for tinning purposes, preparatory to soldering, the eutectic of tin and lead—63 per cent tin and 37 per cent lead—will be found to serve the purpose just as well. This should, in fact, be used generally where it is necessary to tin an article before soldering.

(In all of the foregoing paragraphs on solder the figure first mentioned refers to tin. For example, 40-60 means 40 per cent tin, 60 per cent lead.)

The possibility of using cadmium as a substitute for tin in solder appears promising. Laboratory and manufacturing tests, made by the bureau and by some of the

large users of solders, have given good results. Among others the composition containing 80 per cent lead, 10 per cent cadmium and 10 per cent tin has shown particular promise. The board will be glad to report more fully on this phase of the subject as soon as further commercial tests of cadmium solders have been made. No difficulty is anticipated in connection with the production of cadmium on a commercial basis at a price considerably less than tin as soon as it has been demonstrated that its use for this purpose can be generally extended.

Recovery from Skimmings

Probably most large consumers of both solder and babbitt metals save their skimmings and residue. In the present emergency, small consumers as well as large should make a special endeavor to see that all metal in this form is recovered. It is believed that the aggregate that is lost through these skimmings not being saved is considerable, and that with a full appreciation of the importance of saving such metal, the gain will be appreciable.

Tin Alloy Castings, Bronze, Etc.

It is believed that the percentage of tin in most alloy castings is unnecessarily high. It has furthermore been found that aluminum, bronze, steel, brass or other materials can often be substituted in the manufacture of tin-alloy castings. Wherever possible the percentage of tin in the alloy should be reduced or another metal substituted.

It has been stated that it is a common but questionable practice in brass foundries to look upon tin as the cure for most troubles encountered in the production of brass and bronze castings. In view of the present situation brass and bronze foundries are requested to curtail the consumption of tin wherever possible and to restrict its use entirely to the proved essential needs.

Pittsburgh Foundrymen's Annual

The Pittsburgh Foundrymen's Association held its annual outing at the Westmoreland Country Club, on Monday, June 17. More than 200 members attended, and there was a large number of ladies in the party. After dinner a stirring address was made by Isaac W. Frank, president United Engineering & Foundry Co., who urged foundrymen and foremen to use every effort possible to secure maximum output, and to have, if possible, daily talks with their men, pointing out that it was their patriotic duty to turn out the largest possible output to help win the war. An address was also made by John A. Penton, Penton Publishing Co., Cleveland.

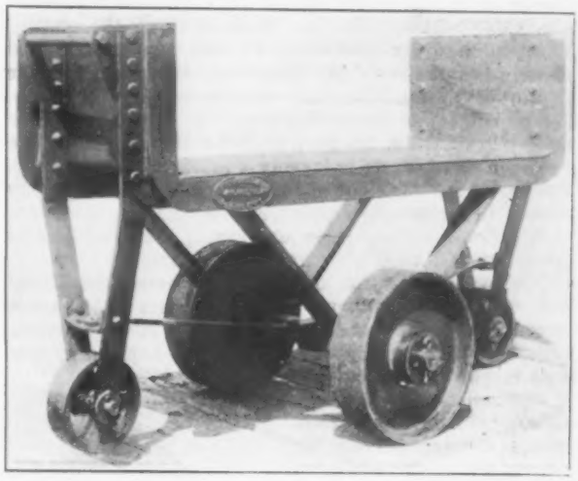
A business session was then held, at which officers for the year beginning September were elected as follows: J. Lloyd Uhler, Union Steel Casting Co., president; A. M. Fulton, Fort Pitt Malleable Iron Co., vice-president; Bayard Phillips, Phillips & McLaren Co., secretary (Mr. Phillips having filled that position since the death, some months ago, of F. H. Zimmers, who was secretary for over 20 years); W. J. Brant, W. J. Brant Co., treasurer. The executive committee is as follows: A. J. Hartman, United Engineering & Foundry Co.; F. H. Clay, Allegheny Steel Co.; L. A. Way, Lewis Foundry & Machine Co.; J. S. McCormick, J. S. McCormick Co., and John B. Coates, Pittsburgh Malleable Iron Co.

The Michigan Bolt & Nut Works, Detroit, Mich., had a printed program for its employees' Flag Day celebration on June 14, containing in addition to the patriotic songs for the day, the pledge of allegiance, the American creed, rules for the display of Old Glory, and the names of honor roll employees. Nineteen out of 22 are foreign names.

The new administration building of the American Rolling Mill Co., Middletown, Ohio, was formally opened June 17. The entire office force and the company's officials assembled in the auditorium, which has been named Armco Hall, where an address was delivered by President George M. Verity.

A High-Level Industrial Shop Truck

A recent addition to the line of industrial trucks and cars built by the Orenstein-Arthur Koppel Co., Koppel, Pa., is a high-level truck for use in industrial plants. It is designed to eliminate the loss of time

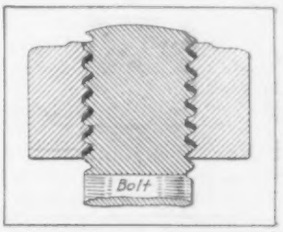


To Eliminate Lost Time and Reduced Efficiency Resulting from Stooping by the Operator in Handling Material to and from His Machine, a High-Level Truck in Which the Load Is Balanced on the Center Wheels Has Been Developed

and the reduction in the efficiency of a machine operator which results from the necessity for stooping or bending in transferring material from the truck to his machine and returning it after it has been finished.

The truck, which is intended to carry a load of approximately 1400 lb., has four wheels, and, it is stated, can be moved about easily when loaded to capacity. The load is entirely balanced on the center axle, which has large diameter, wide tire roller bearing wheels, the two wheels at the ends merely serving as an aid in steering the truck about the plant.

A locknut, in which no keys, extra nuts, washers or separate parts are required, has been brought out by the Holdfast Nut & Bolt Co., 1405 Corn Exchange Building, Chicago. The nuts are placed on a bolt like an ordinary nut and wrenched into place. Friction metal is left only on the clearance side of the nut threads which is under sufficient compression, it is explained, to imbed itself into and adhere firmly to the relatively rough surfaces of the bolt. As soon as the threads are engaged, the nut is locked on the bolt without any necessity for jamming or springing. This metal is under no load stress, it is emphasized, and cannot be forced out. The nuts are furnished with standard threads and in special sizes and shapes if necessary.



Friction Metal on the Clearance Side of the Nut Threads Is Relied upon to Grip the Threads of the Bolt and Furnish a Secure Locking Arrangement

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The Richmond Commercial Club, Richmond, Ind., is to provide for the War Department a technical school for soldiers, for a two months course in automobile mechanics. Workrooms have been obtained in two local automobile factories. A site of 90 acres west of Richmond is under consideration for an airplane factory and training field.

Efforts are being made by Germany to induce Belgian colliery owners and ironmasters to form syndicates after the German pattern, with a view to the establishment of direct co-operation with German export associations, thus eliminating competition after the war.

STANDARDIZING COTTON WASTE

Texture and Absorbency Obtained by Mix-Sheet of Ingredients—Unique Sample Room

The idea that waste is merely a wad of tangled threads used to wipe and polish is refuted by the Royal Mfg. Co., Rahway, N. J., in standardizing the quality of waste, and its bale weights and tare, taking the business out of the field of loose bargaining and into the domain of systematic manufacturing and marketing. The object is to guarantee that the new handful of waste will do the same work that the last one did. The effectiveness of waste is largely a matter of absorbency. Poor waste may be defined in part as one which quickly reaches the saturation point and is thrown aside for fresh. Good waste, it is explained, may be turned inside out and used over and over again.

The standardization of waste begins at the Royal plant with the purchase of baled waste from mills known to discard refuse yarn or cloth of the desired grade and uniformity. To insure an adequate supply large stocks are carried in the company's warehouse, a two-story reinforced-concrete structure served by railroad siding and liberally lighted by skylights to permit of close inspection and grading, and making for clean and safe storage.

Twelve grades of waste, six white and six colored, have been standardized and are carried in stock. To get out an order of any particular mixture of waste, a job card is issued by the order department to the manufacturing department specifying the total weight to be shipped. The prescription is then prepared giving the grade and weight of each element of the mixture. From this formula a sample is prepared and after being approved by the manufacturing department, the mix is made accordingly.

The basic cotton waste materials are: (1) cop, the conical roll of thread formed on the spindle of spinning machines; (2) spooler, thread that has tangled or pulled from spools during the spinning; (3) slasher, sized spooler; and (4) colored threads, which consist largely of colored slasher and colored spooler.

Certain lower grades of desired qualities selected to make a mix are opened and the stuff from one is spread out on tables, 4 x 10 ft., with wire mesh top. Women work it over deftly and pull it toward them in such a manner as to drop dust, lint and all variety of small foreign particles through the mesh, at the same time picking out needles, large metal splinters and other extraneous objects and pushing the cleaned waste into hampers, 3 x 4 x 5 ft., mounted on casters. Where not of a uniform character, the various kinds are sorted and graded into the various hampers. As each hamper is filled it is trundled to bins in the stockroom and the material is used in the mix in the quantity prescribed.

In the mix-room, 60 x 100 ft., a floor space is cleared for mixing the several waste ingredients called for. There the bales are opened and spread out by hand one after another together with the specified screened stuffs, and this process is repeated, layer on layer, until the required weight has been laid.

The mass is yet only incompletely mixed and an additional hand process is resorted to to gain greater uniformity. Standing on all sides of the spread-out mass the mix-gang pulls out handfuls of waste, at the same time cutting with a long knife any lengths of threads over 18 to 24 in. in length. This is then thrown behind them on a cleared space. It is next carried over to another set of large-size screening tables where it is pulled across the mesh, inspected a second time, and repicked, removing any remaining extraneous material, every movement serving to further mix and standardize it.

The mixed waste is, however, at this stage, rather lumpy and unhomogeneous and still not thoroughly assimilated. It is, therefore, necessary to resort to a third process, known as machining.

In this operation the rescreened waste mixture is dropped down a chute to the machining room. This department, 60 x 100 ft., contains 10 picker machines with an individual capacity of 1000 lb. per hr., each belt-driven from a lineshaft driven by one 75-hp. and two 50-hp. motors at 1500 r.p.m. In these picker or carding machines the waste is fed against a rapidly rotating cylinder covered with curved teeth pointed backward from the direction of motion so as to slide over the mass with a stroking action that opens the ply and combs out the material. These cylindrical rollers are encased to hold the waste closely against the teeth. The waste as it is combed is carried over the cylinder and comes away from it on the opposite side as a loose mat. In this form it is wrapped around rollers by the machine tender as it emerges from the mill and is subsequently slid out of the roll at the first op-



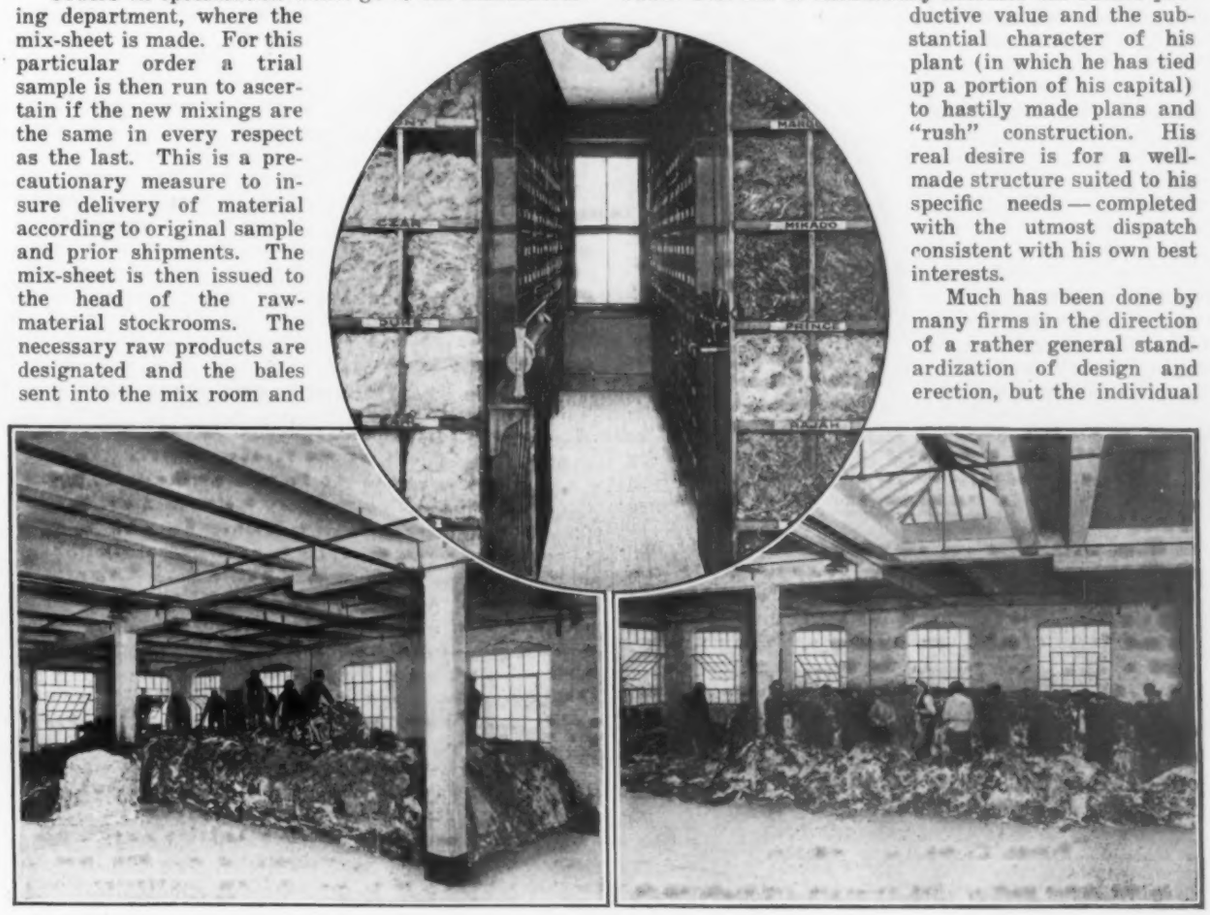
The removal of extraneous matter from cotton waste, the first step in its standardization, is shown at left and above. For mixes specifying low-grade ingredients these stuffs are sorted and graded over screening tables (left) and then rescreened (above) to remove any needles, splinters or other objects that have escaped first inspection. The final process of machine carding to reduce lumpy or unhomogeneous texture of the mix is shown (at right) where tenders are rolling up laps of carded waste on spindles

portunity and later returned to receive another "lap."

Upon the laps reaching the baling department each one is inspected and weighed before being dropped into the baler and exact weights are compressed, equivalent to 94 per cent of the gross bale weight in a 100-lb. bale and allowing exactly 6 per cent for tare consisting of burlap covering and steel bands. Standard bales are 25-, 50-, 100-, 250-, 500-lb. sizes, and also in minature packages, 5-lb. and 10-lb., for garage work. Standardization and uniformity are thus obtained in both the working quality of the waste, in its net weight and in the tare.

When an order is received in the office, it goes to the order department, where it is checked for price, quantity, bale sizes and delivery. It then goes to the manufacturing department and is co-ordinated with other orders on the books, so that the proper efficiency can be reached in laying out the weekly production. Most all orders are on standard grades, and these are filled from stock which is always carried on hand. Such orders go to the shipping room direct, preparatory to the material being loaded on the cars.

Orders on specification waste go to the manufacturing department, where the mix-sheet is made. For this particular order a trial sample is then run to ascertain if the new mixings are the same in every respect as the last. This is a precautionary measure to insure delivery of material according to original sample and prior shipments. The mix-sheet is then issued to the head of the raw-material stockrooms. The necessary raw products are designated and the bales sent into the mix room and the mix-sheet given to the foreman of that room. The desired number of bales of each class of raw material are opened up and the baled weights are checked against the prescribed quantity. After the mixing has been run and baled this sheet is returned to the offices for approval and audit.



The uniformity of orders on specification waste is assured by reference to sample of prior order of identical mix filed in indexed boxes in sample room (circle). The mix gang is shown (at left) laying mix and (at right) pulling mix preparatory to the final carding.

To guarantee absolute uniformity on re-orders a unique sample room has been established. Indexed racks, arranged similarly as library shelves, are employed for filing boxes containing indexed samples of each mix arranged in numerical order and record samples submitted for use in matching future orders. Records are card-indexed and kept in order by the sample-room clerk in charge of this department. He also has charge of making all trial mix samples. Records are kept of all dealings with each account and prospect, a resumé of all correspondence being typed on cards and kept by the sales-promotion department, thereby giving complete information to insure a prompt and logical relationship with every customer.

Building Standards and Standard Buildings

The problem of building for any one industry, according to Gaylord W. Feaga, president Gaylord W. Feaga Co., construction engineer, Cleveland, is not unlike the problem of building for any other industry. One proposition stands out everywhere—that the principal thing is personal service. In every case, the engineer-builder must first get at the best possible solution to the individual problem of each client. After that the constructor does best to rely on stable, tested types of buildings adapted specifically in details to the interests of the owner.

One point especially seems to be established; that really efficient construction is consistent with speed. The significance of time-saving on industrial construction has been, and is now, unusually great; but no owner sets out to deliberately sacrifice the future productive value and the substantial character of his plant (in which he has tied up a portion of his capital) to hastily made plans and "rush" construction. His real desire is for a well-made structure suited to his specific needs — completed with the utmost dispatch consistent with his own best interests.

Much has been done by many firms in the direction of a rather general standardization of design and erection, but the individual service which every owner's undertaking demands should never suffer from too tenacious a principle of standardization for its own sake. The owner who possesses judgment and values his own business realizes that the problem involved in his contemplated industrial building presents of necessity certain aspects peculiar to itself. And he desires to make the engineer and constructor realize this too. His site, his capital, the character of his business, and his future—all these and more have to be taken into consideration. The owner will be fortunate if he retains a firm of constructing engineers which concedes to his business and consequently to his plant, an individuality, because standardization of industrial manufacturing buildings is an excellent and desirable thing, but, like other excellent and desirable things, it has its limits.

Electric Furnace for Forging Steel*

Experimental Furnaces Leading Up to Commercially Successful Units —Silicon Carbide as a Resistor

BY WIRT S. SCOTT

CERTAIN facts relating to an electric forging furnace which the Westinghouse Electric & Mfg. Co. has been developing, are submitted in this paper. Our experimental work on resistor type furnaces for forging has continued through several years. Our first investigation was with granular graphite resistor beds 9 in. wide, 8 in. deep, by 36 in. long, for heating a furnace having an opening 36 in. wide, 24 in. deep by 10 in. high. Other resistor materials and various combinations of materials consisting of granular graphite, coke, charcoal, and finally these materials in various combinations, also in combinations with carbon blocks, were given exhaustive tests, always with the same general result. It is sometimes of equal importance to know the reasons for failures as it is to know the reasons for success, hence it should be of interest to know the reasons for discarding all of the above resistor materials as being unsuitable for an electric forging furnace.

The Resistor Materials

To secure even moderately successful results, it was found that resistor material must be of the purest carbon or graphite. It is quite difficult to obtain a supply sufficient for operating furnaces. If there is any slag or ashes left from the combustion of the resistor, it remains in the bed, so that the relative proportion of such material is gradually increasing with time, causing an increase in the resistance of the furnace. If the slag or ash is fusible at the temperature of the resistor bed, a clinker will be formed which very rapidly extends through the granular mess, resulting in a rapid increase in resistance and consequent failure to heat.

When the furnace was maintained for a considerable length of time at sufficiently high temperatures to turn out heated steel at 1800 deg. Fahr., we found that the temperature in the bottom of the resistor bed exceeded the safe limits of refractory materials. With a temperature of 1800 deg. Fahr. on the surface of the bed, it was found that the temperature at the bottom was approximately 3600 deg. Fahr. This great temperature difference is due to the electrical characteristics of carbon in that it has a large negative temperature resistance co-efficient, that is to say, as the temperature increases the resistance decreases.

Silicon Carbide as a Resistor

In the latter part of 1916 we began our experiments in using silicon carbide as a resistance material. A study of the chemical and physical properties of this material led us to believe that it possessed desirable qualities essential to a suitable resistor for an electric forging furnace, but also indicated that there were many difficulties to be overcome which were real problems in themselves.

This material possesses the following excellent qualities:

The temperature of decomposition is above 4000 deg. Fahr., which is approximately 1500 deg. higher than the hottest temperature required at the surface of the resistor. Due to the construction of furnace employed, the atmosphere in the furnace chamber is non-oxidizing, and under these conditions the resistor is non-consuming.

It may be molded in block form, allowing the heating element to be placed in any desirable position around the heating chamber.

Due to its high tensile strength, the roof of the heating chamber, as well as the hearth, may be made out of these resistor blocks.

The fact that it has a large negative temperature resistance co-efficient may be utilized in the control of the furnace temperature by controlling the current input to this resistor material.

First Complete Furnace

The first complete furnace of this type which we built and gave promise of success had an outside dimension 41 in. wide across the front, 27 in. deep and 48 in. high. It was designed with two working chambers 7 in. long by 5 in. high, for the heating of 50 lb. of steel per hour to 1800 deg. Fahr. in each chamber, or a total of 100 lb. per hour for the furnace. The resistors consisted of blocks having a cross section of 4½ in. by 2½ in. passing above and below the working chamber. The resistors terminated in electrode chimneys filled with granular graphite, into which steel terminal plates extended, for external connections.

Owing to the high resistance of this type of furnace when cold, and due to the length of resistors used, a starting voltage of 220 volts was required, which was cut down in a few minutes' time to 110 volts, and then gradually reduced until 60 volts was reached, which maintained the proper temperature.

The time required to bring the furnace up to an operating temperature of 1800 deg. Fahr. was 8 hr., starting with the furnace cold. Owing to the great heat reserve capacity of the furnace, the time required in successive heatings were greatly reduced, depending upon the length of time the furnace was out of operation. In order to have the furnace available for immediate use, sufficient current was maintained during the night to supply the radiation losses. On a 20-hr. continuous forging test the average input was about 18 kw., or 300 amperes at 60 volts. The charge during this test consisted of approximately four pieces of steel weighing 6 lb. total, each piece requiring an average of three heats, one from cold to 1800 deg. Fahr., the other two from about 900 deg. to a final temperature of 1800 deg. Fahr. The hourly output averaged 20 lb. heated from 70 deg. to 1800 deg. Fahr. and 40 lb. from 900 deg. to 1800 deg. Fahr.

No special attention was given to the thermal insulation of the furnace since that was of secondary importance, and a matter which could be taken care of at a later date, once we secured a suitable construction. Notwithstanding the light insulation that was used, a furnace efficiency of 41 per cent was maintained. The furnace ultimately proved unsatisfactory due to unequal heating of the two chambers. The results of the tests proved conclusively that a temperature of 1800 deg. Fahr. could be obtained and maintained for an indefinite period so far as the resistor material was concerned. Hand control was used entirely in the operation, in conjunction with a circuit breaker for tripping the circuit should the current increase beyond a safe operating value.

The Second Furnace

The second complete furnace had an overall dimension of 48 in. wide, 38 in. deep by 48 in. high, inclusive of an iron stand 12 in. high. The radiating surface was approximately 81 sq. ft. The resistor consisted of two blocks 2½ by 4½ in. cross section by 9 in. in length, connected in parallel, one over the heating chamber, and one underneath 2½ in. apart, forming a heating chamber 7 in. wide, 11 in. deep by 2½ in. high. The resistors were surrounded and imbedded in a refractory lining made up principally of a crucible clay and a graphite mixture. Surrounding this extremely

*Abstract of a paper read at Pittsburgh before the Association of Iron and Steel Electrical Engineers. The author is commercial engineer, Westinghouse Electric & Mfg. Co., Pittsburgh.

hot area, silica bricks were used, backed up by ordinary fire bricks.

Electrode chimneys or wells were used very much the same as with the first furnace. The electrodes consisted of granular graphite and an amorphous carbon rod 4 in. square by 20 in. long imbedded in each electrode well, and extending upward from near the steel terminal plate at the bottom of each well to the ends of the two resistors. The granular graphite insures electrical contact between the resistor blocks and the carbon block, and between the carbon block and the terminal plate. A cool terminal is thus obtained.

The heat insulation on the outside of the furnace consisted of 4½ in. of high grade insulating brick all around, except opposite the electrode walls and around the door. Thin sheet steel held in place by angle iron and tie rods clamped the insulating bricks together.

The starting voltage on this furnace was 75 volts, and the time required to raise the temperature of the heating chamber to a forging temperature of 1800 deg. Fahr. was two hr. The power required at full load was 10 kw., or approximately 300 amperes at 33 volts. At no load, a consumption of 5 kw. or 200 amperes at 25 volts obtained. This corresponds to an efficiency of 50 per cent.

The longest continuous run extended over a period of 15 days, or 370 hr., the furnace being maintained continuously at a forging temperature of 1800 deg. Fahr. After these tests an examination of the resistors was made, but no perceptible effect due to heating could be determined.

The control equipment consisted of a 110 volt. transformer with knife switches for obtaining starting voltage, and interlocked magnet switches, push button operated for obtaining the required running voltage. A circuit breaker was used as in the first case for protecting the furnace against an increase in current above the safe operating value.

Furnace Under Shop Conditions

The first furnace to be placed in continuous operation under actual shop conditions was made early in 1917. This furnace, a duplicate of the one last described, was installed in the tool forging shop of the Westinghouse Electric & Mfg. Co., and while it was considered that the furnace was still in its experimental stages, it was essential that we gain the experience of knowing how it would stand up under regular shop conditions.

Several failures of the furnace were recorded, but in each case the failure was due to the improper functioning of the control equipment which we were developing and experimenting with at that time. This furnace has been in operation for a period of one year, with highly encouraging results. Many runs have been made of continuous operation for periods of 400 and 500 hr., forging high speed steel to 1850 deg. Fahr. and drop forging at 2200 deg. Fahr. without any records of register failure, or any perceptible deterioration in the register due to the high operating temperature. One run of 500 hr. was made at a temperature of 2650 deg. Fahr. without experiencing any difficulty whatever.

For high speed steel work it was found advisable to preheat it before placing it in the heating chamber. A preheating chamber was constructed under the heating chamber, consisting of an opening in the front of the furnace just below the lower resistor, into which the tools could be placed for preheating to eliminate strains that otherwise would be set up in the steel when placed in the furnace.

Furnace for Drop Forgings

Another furnace has been built and placed in operation at our works, having a heating chamber 18 in. wide, 12 in. deep and 4½ in. high. The capacity of this furnace is 20 kw., the starting voltage 220, and the running voltage 70. The efficiency is 60 per cent. This furnace is designed to operate on steel drop forging requiring a temperature of 2300 deg. Fahr.

The control equipment at the present time is not completely automatic. That is to say, the furnace is not automatically brought up to the required temperature, but once the required temperature is obtained, then the control equipment will maintain that temperature within certain limits. Interlocked knife switches are used for connecting to the starting taps on the transformer. As the furnace increases in temperature it is necessary to step down to lower voltages. The lower voltage taps are controlled by means of magnet switches operating over a relatively small percentage of the voltage range in order to obtain close temperature regulation.

The control equipment thus far developed is semi-automatic in its action and may be used with entire satisfaction where the operator has a proper appreciation of the functioning of the control equipments. However, it is our intention to ultimately develop a complete automatic control equipment, which we hope to have perfected at an early date.

The general type of the furnace such as we have developed has a very wide application, but our experiments thus far have been largely confined to forging, vitreous enameling, and for the reheating of glassware. A special furnace has been constructed and is successfully operated for the forming of lamp chimneys.

The furnace described offers an ideal solution of the problems connected with full-fired furnaces because:

Uniform temperature is obtained in all parts of the heating chambers.

The temperature best found to produce the most satisfactory results may be obtained and maintained indefinitely.

A neutral atmosphere is obtained in the furnace chamber, thereby eliminating the major part of the oxidation of the steel.

For a given class of work subjected to a given heating operation the following conditions must apply:

The rate at which the work is heated is capable of infinite variation, but there must be some best sequence of heating.

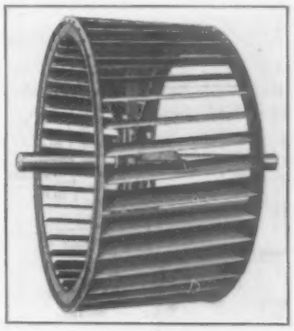
The temperature difference between the heating medium and the work may be almost any value, but there must be some best value.

The maximum temperature to which the work is heated may be almost any value but there must be some best maximum temperature for each grade of steel.

An electric furnace permits of doing such experimental work as will exactly determine these factors; and, once they have been determined, it permits an operator to duplicate these results in operation: the ultimate feature in which we are interested.

A New Multivane Type of Fan Blower

The Garden City Fan Co., 1532 McCormick Building, Chicago, has placed on the market an improved type of multivane fan. A distinguishing feature is the setting of the paddles or vanes at an angle to the shaft. In addition to being set at an angle to the shaft the vanes are curved forward at a predetermined radius, this arrangement being relied on to increase the feed area and maintain a uniform unrestricted flow across the entire width of the wheel.



The Paddles or Vanes in a New Type of Fan Are Set at an Angle to the Shaft and Are Riveted to Retaining Rings and Attached to a Spider Mounted on the Shaft

Each vane is a single piece of steel riveted to an outer disk or retaining ring, which in turn is reinforced by a single piece of angle iron. The steel spiders carrying the main paddles are cast integral with a heavy gray-iron hub fastened to the shaft. This form of construction, it is emphasized, gives a rigid light unit, thus decreasing the deadweight load on the bearings.

REPORTS ON JOBBERS' STOCKS

Forms Employed by Director of Steel Supply—Blanks for Pig Iron Producers

As already told in these columns, the leading jobbers in iron, steel, hardware and machinery at a conference held in Washington, June 13, with the Conservation Division of the War Industries Board arranged for full co-operation of the jobbers with the Government to insure the largest possible application of jobbers' stocks to war necessities. As a result of the conference it was regarded probable that a committee representing the different branches of the jobbing trade in iron, steel, hardware and machinery in all sections of the country would be appointed to sit in conference with the Priorities Committee and the Director of Steel Supply on questions arising as to the apportionment of product to jobbers and the replacement of jobbers' stocks. A form for monthly reports by jobbers was recommended by J. L. Replogle, Director of Steel Supply, and was adopted. A reproduction of this form is given herewith.

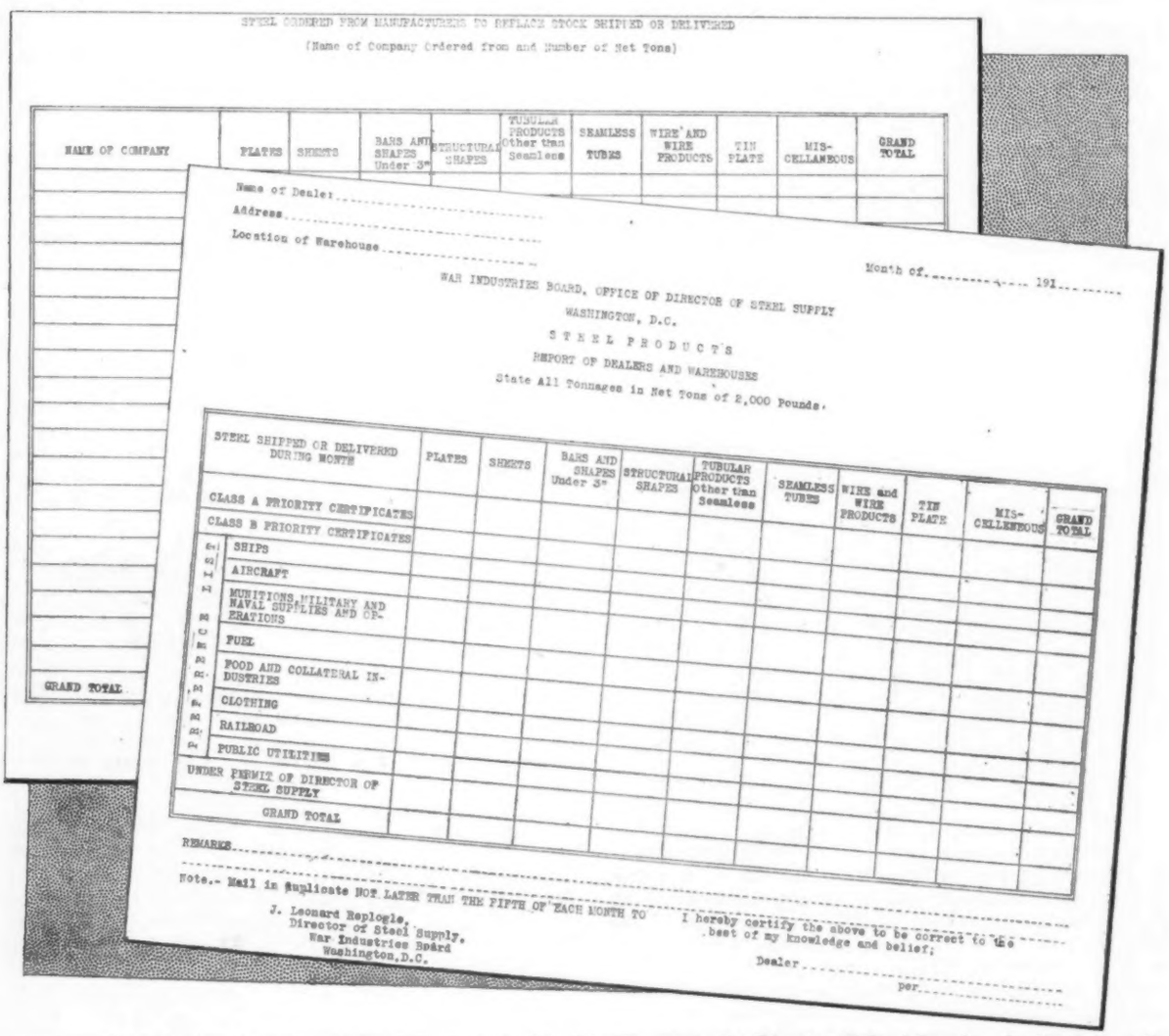
An accompanying illustration shows the new form used by pig iron producers for weekly reports of production, new orders and shipments, to the Director of Steel Supply. Formerly these reports dealt with totals, but provision is now made for the separation of direct and indirect orders entered on behalf of the Government, also direct and indirect shipments on Government account, as well as direct and indirect orders on account of the Allied governments. The information furnished on these blanks is made more valuable by the data which will come into the hands of the War Industries Board through the questionnaire to which blast furnaces and melters of pig iron recently contributed.

Co-operation of Jobbers with Manufacturers

In order to secure 100 per cent efficiency in supply of steel for strictly war essentials the closest co-operation is being maintained between jobbers and manufacturers. The National Tube Co. at Pittsburgh sends out each week to its jobbing trade a blank to be filled out and returned. This gives in net tons the distribution made "both from stock and direct shipment from your mills," classified as follows: 1.—United States Government business; 2.—Railroads and locomotive and car builders; 3.—Mining, oil, gas, coal and metals; 4.—Manufacturing plants for operating and maintenance; 5.—Manufacturing plants, for fabrication and finishing; 6.—Agricultural and food purposes; 7.—Domestic welfare and public utilities, and then any other classifications as essentials not referred to above.

The reports are mailed Wednesday evenings, the original to J. J. Kennedy, general manager of sales, and a copy to the local manager of sales in jobber's district.

The United Engineering & Foundry Co. has closed its iron foundry at its William Tod Works at Youngstown, Ohio, and in the future all iron molding will be done at its Oak Street plant, while the machine work will be done at the Lloyd-Booth Works. The foundry just abandoned has been in operation for more than 50 years, and for a long time castings for the Tod engine formerly built by the William Tod Co. were made in it.



STEEL ORDERED FROM MANUFACTURERS TO REPLACE STOCK SHIPPED OR DELIVERED

(Name of Company Ordered from and Number of Net Tons)

NAME OF COMPANY	PLATES	SHEETS	BARS AND SHAPES Under 3"	STRUCTURAL SHAPES	TUBULAR PRODUCTS Other than Seamless	SEAMLESS TUBES	WIRE AND WIRE PRODUCTS	TIN PLATE	MISCELLANEOUS	GRAND TOTAL
GRAND TOTAL										

Name of Dealer.....

Address.....

Location of Warehouse.....

Month of..... 191...

WAR INDUSTRIES BOARD, OFFICE OF DIRECTOR OF STEEL SUPPLY

WASHINGTON, D.C.

STEEL PRODUCTS

REPORT OF DEALERS AND WAREHOUSES

State All Tonnages in Net Tons of 2,000 Pounds.

STEEL SHIPPED OR DELIVERED DURING MONTH	PLATES	SHEETS	BARS AND SHAPES Under 3"	STRUCTURAL SHAPES	TUBULAR PRODUCTS Other than Seamless	SEAMLESS TUBES	WIRE and WIRE PRODUCTS	TIN PLATE	MISCELLANEOUS	GRAND TOTAL
CLASS A PRIORITY CERTIFICATES										
CLASS B PRIORITY CERTIFICATES										
SHIPS										
AIRCRAFT										
MUNITIONS, MILITARY AND NAVAL SUPPLIES AND OPERATIONS										
FUEL										
FOOD AND COLLATERAL INDUSTRIES										
CLOTHING										
RAILROAD										
PUBLIC UTILITIES										
UNDER PERMIT OF DIRECTOR OF STEEL SUPPLY										
GRAND TOTAL										

REMARKS.....

Note.- Mail in duplicate NOT LATER THAN THE FIFTH OF EACH MONTH TO

J. Leonard Replogle,
Director of Steel Supply,
War Industries Board
Washington, D.C.

I hereby certify the above to be correct to the best of my knowledge and belief;

Dealer.....

per.....

Forms Used by Dealers in Iron and Steel Products in Monthly Reports to the Director of Steel Supply. On the face of the blank return is made of all shipments: First, on priority certificate; second, to consumers in preferred industries; third, under permit of Director of Steel Supply. On the reverse side of the blank a report is made of orders given to mills to replace stock shipped out

Name of Company ..... Report for the Week Ending .....

Location .....

WAR INDUSTRIES BOARD, WASHINGTON, D. C.

PIG IRON, FERROMANGANESE, ETC.

All in Gross Tons

	BASIC	BESSEMER	FOUNDRY AND MALLEABLE	LOW PHOS.	BESS. FERRO HIGH SILICON	SPIEGEL FERROMANG.	ALL OTHER, INCLUDING OFF IRON	GRAND TOTAL
1. Tonnage brought forward from last week								
2. Tonnage received during week								
3. Total tonnage								
4. Tonnage shipped during week								
5. Tonnage entered during week								
6. Total outstanding tonnage at end of week								
7. Tonnage produced last week								
8. Stock on hand								
9. Total direct Government tonnage on books								
10. Total indirect Government tonnage on books								
11. Total direct Government shipments during week								
12. Total indirect Government shipments during week								
13. Total direct Allied Governments tonnage on books								
14. Total indirect Allied Governments tonnage on books								

15. Total number of furnaces (.....). Number of furnaces in blast (.....). If reduced output state cause.

Send Original each Monday to
J. LEONARD REPLOGLE,
Director of Steel Supply,
War Industries Board,
Washington, D. C.

Send Duplicate each Monday to
Mr. H. G. Dalton, Chairman,
Subcommittee on Pig Iron, Iron Ore, and Lake Transportation,
800 Western Reserve Building,
Cleveland, Ohio.

Signed .....

By .....

Form Used by Pig Iron Producers for Weekly Reports to Director of Steel Supply on Production, New Orders and Shipments

Operating Features of Two Morgan Motor-Driven Mills

Operating features of a 21-in. and an 18-in. Morgan motor-driven continuous mill were given by H. C. Cronk, McKinney Steel Co., Cleveland, in a paper, from which the following is taken, presented before the Cleveland section of the Association of Iron and Steel Electrical Engineers. The mills are capable of rolling billets 5 x 5 in. to 4 x 4 in. on the 21-in. end, which has four stands, and sheet bars on the 18-in. end which has six stands equipped with two 16-in. vertical edging stands for rolling sheet bar down to ¼ in. at the rate of 115 tons per hour at maximum capacity.

The 21-in. mill is fed directly from the blooming mill with no reheating, the product being delivered to a 160-ft. skew table from which it is transferred either to the shears or hot saw or to the 18-in. mill for further rolling. Leaving the 18-in. mill the product is sheared by a Morgan flying shear, and passes from it to the piling rolls and to the bar piler or skew table as desired. Preceding the 18-in. mill is a preliminary shear of the guillotine type with a swinging head driven directly from the first stand driving shaft through a slip friction gear, the purpose of the shear being to cut any bad ends that may be on the piece coming from the 21-in. mill or to cut the piece as it passes through the 18-in. mill in case of a cobble. This, the author said, reduces scrap and the time to clear the mill. The maximum time necessary to change the entire mill from one product to another is 6 hr., duplicate housings being set up on the floor before the contemplated change is made so that it is only necessary to remove the stand or housing containing the old rolls and replace it with another containing the new rolls, guides, etc.

The piling roll he considers the most vital auxiliary of the mill as when rolling sheet bar it must keep the product from the mill after it leaves the flying shear. This roll consists of a housing containing two rolls, the top being driven by friction and loaded by a spring. It is imperative that it run at a uniform speed which is governed by the shunt field. An adjustment of the piling roll is provided so that it can be shifted nearer or closer to the cradle.

The mill motor was originally equipped with magnetic control with lockout accelerating switches and a shunt field relay. This proved unsatisfactory due partly to the method of power distribution. A manual rheostat with separate field control was finally installed and proved successful. The load on this motor varies from 5000 kw. to 2000 kw., the maximum occurring when light sections are rolled. When rolling an average of 20,333 tons per month the energy consumption, he said, is about 23 kw.-hr. per ton of steel.

To Readjust Industry

(*Continued from page* 1649)

A. C. Barley, division 13. Headquarters for the entire State will be maintained at the Detroit Board of Commerce with A. A. Templeton in charge.

Appointment of Mechanical Engineers

Utilizing the local sections organization of the American Society of Mechanical Engineers, President C. T. Main has appointed representatives of the society to act on the regional committees and he has also created a national committee of the society on readjustments of industries for war work. The last step is largely the outcome of a meeting held by the society some months ago in New York on so-called non-essential industries and the committee is composed of G. K. Parsons, industrial engineer, New York, and F. A. Schleffler, and Erik V. Oberg. The society section representatives on regional committees are as follows:

Bridgeport, Conn., Harry E. Harris; New York, G. K. Parsons; Philadelphia, Lewis F. Moody; Pittsburgh, J. M. Graves; Rochester, N. Y., F. W. Lovejoy; Cleveland, F. H. Vose; Detroit, G. W. Bissell; Chicago, A. D. Bailey; Cincinnati, Fred A. Geier; Baltimore, William W. Varney; Atlanta, Oscar Elsas; Birmingham, J. H. Klinck; Kansas City, Mo., J. L. Harrington; St. Louis, R. L. Radcliffe; Milwaukee, W. M. White; Dallas, A. C. Scott; San Francisco, B. F. Raber; Seattle, R. M. Dyer; Boston, A. C. Ashton; St. Paul, Paul Doty.

The Electric Steel & Forge Co., at 6600 Grant Avenue, Cleveland, will shortly place contracts for buildings, mill and other equipment for extensions to its rolling mill plant for the manufacture of alloy and tool steel. A 6-ton and 3-ton electric furnace of the Heroult type will be installed. This company has succeeded the Crucible Steel Forge Co. In a recent item regarding the taking over of this plant by the new company this name was incorrectly given as the Crucible Steel Co.

It is said that the Pennsylvania Railroad Co. will build a roundhouse and engine house at Blairsville, Pa.

Specifications for Shells of Semi-Steel

Tensile Strength and Impact Tests Are Detailed, Mixture and Chemistry Being Left to the Foundryman

For some time the engineering bureau of the Ordnance Department at Washington has been at work on specifications for semi-steel shells. The matter has progressed to the point of the formulation of such specifications and the manufacture of a test lot of 8-in. shells at an Eastern foundry. It is understood that ballistic tests have been made of these shells with entirely satisfactory results. Fragmentation tests are yet to be made. The specifications as they stand, which are still subject to modification as the result of experiments now being conducted, are given below:

SPECIFICATIONS FOR CASTING AND MACHINING SEMI-STEEL PROJECTILES

1. *Castings:*

Projectiles will be cast from semi-steel, with a riser having a volume sufficient to insure sound metal free from segregation and porosity.

2. *Physical Tests:*

Test bars shall be taken from the pouring ladle at each cast and each test bar shall be cast in a vertical baked sand mold from which it shall not be removed until it no longer shows the color of heat.

The physical tests shall consist of a tensile strength test and an impact test, and in each test if the first test specimen meets the requirements the test shall be considered to have been passed. If the first specimen tested fails to pass the test, the two substitute specimens may be submitted, both of which must meet the specified requirements in order to pass the test.

In case a test specimen fails on account of the presence of physical defects, such as blowholes, coldshuts, or the like, a new test bar may be submitted in its place, and the specimen so failing shall not be considered as a test.

(a) Tensile Strength Test:

The test bar shall be cast 1¼ in. in diameter, with a length of 8 in. and a riser of 4 in. After removal of the riser the test specimen will be machined to a diameter of 1.128 in. for a minimum length of 4 in. The tensile strength of the specimen must be at least 32,000 lb.

(b) Impact Test:

The test specimen, 1½ in. square and not exceeding 1.52 in. on any side, shall be cast with a length of 8 in. and a riser of 4 in. After removal of the riser the bar will be placed on two knife edge supports 6 in. apart, which in turn are supported by an anvil weighing at least 1750 lb. A weight of 25 lb. will be caused to fall exactly on the middle of the test bar. The test will begin with the weight at a height of 12 in. and the test will be repeated with the height of the weight increased by ½-in. intervals until the bar breaks. The height of fall for causing rupture will be not less than 18 in., this height being measured from the upper surface of the bar to the lowest part of the testing weight.

Test bars may be machined for a width of ¼ in. at the lines of bearing on the knife edge supports.

The impact testing machine shall be made in accordance with the drawings of the Ordnance Department and must be approved by the Government inspector.

3. *Inspection:*

Certified copies of physical tests shall be supplied to the Government inspector, and all physical tests shall be conducted in his presence. In case the casting and machining operations are conducted by different manufacturers, both the castings and machined projectiles will be inspected by a Government inspector. When the casting and machining operations are performed by the same manufacturer, the Government inspection of castings may be waived.

Certified copies of chemical analyses shall be supplied to the Government inspector for such casts as he may specify.

(a) Inspection of Castings:

Castings must be free from blisters, blowholes and cracks, except that slight imperfections may be allowed on the outside of the casting in front of the position to be occupied by the rotating band, provided that they do not extend to a depth of more than one-fourth of the thickness of the wall and do not exceed ⅛ in. in diameter. The castings shall be free from sand, both inside and outside, before being submitted for inspection. The inside of castings shall be smooth and in the case of castings for high explosive shell shall be sand- or shot-blasted or rumbled in a manner satisfactory to the Government inspector.

Each casting on being struck with a hammer must give a clear metallic ring; those giving a dull sound will be rejected.

The castings shall be capable of being readily chipped, filed and machined.

Risers shall be removed from the castings before submitting them for inspection.

At the option of the inspector an occasional casting may be fractured to determine the soundness of the metal. Castings so fractured shall not exceed 1 per cent of the total.

(b) Inspection of Machined Projectiles:

Projectiles shall conform to the dimensions shown on the drawing. The inspection for blowholes and other imperfections in the machined projectiles shall be the same as prescribed above for castings. If, in the process of machining, blowholes or other imperfections are developed, the Government inspector shall be notified immediately and work shall be continued only by his authorization.

Projectiles to be used for gas shell shall be coated with a soap solution and subjected to an air pressure of 100 lb. per sq. in. for 30 sec. There must be no evidence of the formation of soap bubbles during this test.

All projectiles shall be subjected to a hydraulic test for 15 sec. Projectiles of 6-in. caliber and less shall be tested at 4500 lb. per sq. in., and projectiles of caliber larger than 6 in. shall be tested at 3000 lb. per sq. in. All projectiles showing any leakage or permanent expansion of more than 0.001 in. per inch of caliber, approximately ½ in. in rear of the bourrelet, shall be rejected and mutilated in such manner as to prevent them from being resubmitted.

The air test and hydraulic test shall be performed before banding, and, in the case of gas shell, the air test shall precede the hydraulic test.

All shell shall be thoroughly dried after the hydraulic test.

No white or red lead shall be used in any operation in the manufacture of high explosive shell.

4. *Banding:*

The copper band will be pressed into its seat in such manner as to be securely fastened to the projectile, and this will be tested by tapping with a small hammer and the occasional removal of a band for examination. The finished band must be tough and in uniform condition. A removed band must be capable of being bent around a round bar of a diameter equal to the thickness of the band without showing cracks. Replacement of new bands for those failing on the test shall be at the expense of the contractor, and for those meeting the test, at the expense of the Government.

5. *Rejected Projectiles:*

In case the casting and machining operations are performed by different contractors, the following provisions will apply:

(a) If projectiles are rejected at the plant of the machining contractor on account of defects in the castings, such castings shall be replaced by the foundry contractor or the Government shall be reimbursed for the value of the same.

(b) The machining contractor will reimburse the Government for the value of castings rejected due to defects in machining operations for which he is responsible.

6. *Facilities for Inspectors:*

Inspectors and other duly accredited representatives of the Government will have free entry at all times to all parts of the manufacturer's plant which concern the manufacture of the material ordered. The manufacturer will afford the Government representatives free of cost, all reasonable facilities to satisfy them that the material is being furnished in accordance with these specifications. All the tests and inspections will be made at the place of manufacture prior to shipment and will be so conducted as not to interfere unnecessarily with the operation of the plant. The manufacturer will provide within his plant a suitably furnished office for records, drawings, books, etc., to be used exclusively by the Government representatives.

7. *Gages:*

The manufacturer will provide all the gages needed for the manufacture and inspection work, except that the Government will in general provide the inspectors with a set of reference inspection gages covering the important dimensions to be gaged. These will be available for reference purposes. A satisfactory system of gage inspection and checking must be maintained by the manufacturer. Inspection gages will be inspected and checked by the Government inspector. Drawings of all gages will be submitted by the manufacturer for approval.

8. *Marking:*

(a) When the casting and machining operations are performed by different manufacturers, each casting shall be permanently marked with the cast number and symbol of the foundry and accepted castings shall be stamped by the Government inspector. The machined projectiles made from such castings shall be stamped with the cast number, the symbol of the foundry and the symbol of the machiner, and after acceptance shall be stamped by the Government inspector.

(b) When the casting and machining operations are performed by the same manufacturer, the finished projectile shall be stamped with the cast number and the symbol of the manufacturer, and after acceptance shall be stamped by the Government inspector.

9. *Varnishing, Painting and Packing:*

Varnishing, painting and packing shall be performed in accordance with current specifications.

An interesting appeal for factory workers was recently made in the daily press of Warren, Ohio, by the Packard Electric Co. It advertised that it would not be fair to the other industries of the city to entice their workers, and therefore it called on "the people of Warren who do not have to work in factories for a livelihood, but who are willing to do something practical and vital."

AGAINST BONUS PAYMENTS

House Rejects Senate Amendment to Naval Appropriation Bill

WASHINGTON, June 25.—In servile obedience to labor unions which in telegrams to Chairman Padgett of the house naval committee have boldly threatened a walkout in all manufacturing departments of the Government unless the provision incorporated by the Senate in the naval appropriation bill permitting the payment of bonuses and premiums to workmen is beaten, the House of Representatives, after a humiliating exhibition of cowardice in which it reversed its own vote within ten minutes, has instructed its conferees to insist on the abandonment of the Senate amendment. With the parliamentary advantage against the Senate in that the prohibition of all scientific management methods was voted into the naval bill a year ago, thereby constituting a precedent, it is altogether probable that the insistence of the House will prevail and that the Senate, after a show of resistance, will yield the point.

The story of the fight over this amendment in the Senate was recently told in this correspondence. The House had placed the familiar anti-scientific management rider on the naval bill and a contingent of Senators under the lead of Senator Gallinger, of New Hampshire, after an unsuccessful attempt to strike out the entire provision, succeeded in dividing the question, with the result that the Senate retained the provision forbidding the use of stop watches and time studies, but rejected the prohibition against the payment of premiums and bonuses. The bill was then sent to a conference committee to harmonize the diverse provisions of the House and Senate drafts of the bill, and this committee, after a futile effort to reach a satisfactory adjustment concerning the rider, reported a disagreement to the two houses.

When the report of the conference committee was called up in the House on June 20, Chairman Padgett moved that the House insist upon the abandonment by the Senate of the provision permitting the payment of premiums and bonuses. A strong protest against Mr. Padgett's motion was made by Representative Good of Iowa. Mr. Good's spirited speech provoked loud applause on both sides of the House chamber, whereupon Chairman Padgett, fearful lest his motion would be lost, proceeded to read into the *Record* two telegrams received from labor union officials. Representative Cannon of Illinois suggested that Mr. Padgett would do well to acquaint the writers of the telegrams with the fact that the President has power to draft into the military service "experts in industry" and compel them to work for $30 a month. Representative Good again emphasized the fact that the payment of premiums and bonuses does not necessarily involve the use of the Taylor system, whereupon Representative Keating of Colorado declared that the bonus and premium are "parts of the Taylor system" and that "you cannot have one without the other." Representative Nolan of California followed in a long defense of the labor unions and concluded by reading into the *Record* a series of resolutions adopted by the American Federation of Labor at its convention in St. Paul on June 14 urging the restoration of the language eliminated from the naval appropriation bill in the Senate. The Senate amendment was strongly defended by Representative Black of Texas, who quoted the Secretary of War and numerous ordnance officials. Representative Keating told the House that whatever the attitude of the Secretary of War might be, the Secretary of the Navy was opposed to scientific management. Representative Madden of Illinois demanded the retention of the Senate amendment.

The debate was brought to a close by Representative Good, who quoted from testimony before the House Naval Committee flatly contradicting Secretary Daniels' statements regarding the spirit shown by many workmen in the navy yards. "The chairman of the naval committee, the gentleman from Tennessee," he said, asked Admiral Earle, chief of ordnance of the Navy:

> Is it true that labor at $2 produced as much labor result as $4.40 now produces—that is, 8 hr. labor at $2 a day then produced as much product or result as a 10-hr. day now produces at $4.40 a day?
>
> Admiral Earle—Yes.
>
> Admiral Parks—In many cases it produced more than the 10-hr. day now produces. The efficiency is low.
>
> The Chairman—That is certainly a sad comment.
>
> Admiral Parks—It is a terrible business, Mr. Chairman. It is the most serious thing in this country. It is the most serious thing in the war or anything else.

"Admiral Parks, chief of the Bureau of Yards and Docks, gave similar testimony before the committee as late as May 29, 1918, as follows:"

> The Chairman—On the question of labor, how does the product as the result of the 10 hr. of labor which costs you $4.40 compare with the 8 hr. of labor for which you paid $1.60 before the war?
>
> Admiral Parks—All the information I have indicates that less useful work is secured for the $4.40 than was formerly secured for $1.60, and some have placed it as low as 65 per cent.

The question being taken, the House voted to retain the Senate amendment, 50 ayes to 37 noes. A demand was then made for a roll-call, whereupon the House reversed itself and instructed its conferees to reject the Senate amendment by a vote of 205 to 87.

Germany and Turkish Manganese Ore

According to reports from Constantinople there is now unusual activity in developing the mineral resources of both European and Asiatic Turkey. No less than 90 applications for concessions have recently been put in to open up deposits of ore in the vilayet of Aidin alone. In particular, chromite ore deposits are being keenly sought, and it is said that the Krupps have acquired the rights in two mines, and are negotiating for the purchase of two more. So far, over 60 chromite ore mining concessions in Asiatic Turkey have been granted by the government. Concessions have also been obtained lately by Turkish subjects to develop manganese deposits at Kütshük, in the sandjak of Menteché, and iron ore deposits at Burgas, villayet of Hudavendighiar; by a German subject to work a manganese mine at Inludja, in the sandjak of Menteché; and by an Austrian to open up a manganese mine near Kapakli-Kapus-Dere, also in the sandjak of Menteché. Reports of discoveries of important deposits of iron ore, chromite ore, and coal in the vilayet of Brussa, and of nickel ore near Akkais, in the vilayet of Kastamuni, have also been received. The Heraclea coal mines, which formerly belonged to a French company, are now reported to have been acquired by the Turkish Government and are being worked as a state undertaking.

To Build 330 By-Product Ovens at Swedeland

A corporation known as the Rainey-Wood Coke Co. has been organized by the W. J. Rainey interests, operating coal mines and coke works in the Connellsville region, and the Alan Wood Iron & Steel Co., with blast furnaces and steel works at Swedeland, Pa., for the building of a by-product coke plant of 330 ovens at Swedeland, Pa. The coal will be furnished by W. J. Rainey from mines in the Connellsville region. Work has been started on the first unit of 110 of these ovens and it is expected to have the plant in operation within 14 months. This first installation will supply coke, gas and tar to the Alan Wood Iron & Steel Co. and will have sufficient additional capacity to furnish foundry coke for the Eastern market. A complete by-product recovery plant will also be constructed for the purpose of furnishing sulphate of ammonia and toluol to the Government.

It is proposed to install the remaining units as soon as possible, in order to insure a continued coke supply for the merchant blast furnaces in the Schuylkill and Lehigh valleys.

Grace Motors, Ltd., with headquarters in Toronto, and branches in the principal cities of Canada, is now the Canadian distributer for the Sterling Motor Truck Co., Milwaukee.

ESTABLISHED 1855

THE IRON AGE

EDITORS:

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CHARLES S. BAUR, *Advertising Manager*

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Future of the Railroads

While various manufacturing, commercial and banking activities are Government controlled more or less completely at the present time, the case of the railroads stands by itself. We had had a serious matter with the railroads for years, a matter that was made much more serious still because we did not sufficiently realize that the problem was confronting us. What is to be the future of the railroads? It is idle to mention as a governing or even an important factor that it will be impossible to return the roads to their owners. It might with equal facility have been said that it would be impossible for the Government to take them from their owners, but it did so, on two days' notice, and by existing law there is virtually more than two years' time in which to prepare the roads for a return, for presumably it will be possible to foresee peace as a probability before it is actually declared.

The fact that we did not solve our railroad problem before the war is no reason for saying that we cannot solve it. It need not be assumed, moreover, that we must have either private operation as we had before or Government operation such as we have of the Postoffice Department. There are many courses that lie between.

There is no proposal, of course, that a program should be mapped out at this time. Obviously we should profit by the experiences we pass through, whereby information will be acquired that will be helpful in solving the problem when its solution becomes necessary. That is, it is a definite obligation that these experiences be scrutinized as they pass. They are going to prove helpful and they must not be forgotten.

It is of particular importance to study closely the changes that have occurred in the making over of the railroads, as the old conditions have been made to yield to the new. Such study will be difficult when the war is over. Thinking men should give attention to these changes now, and earnest and sober, not superficial, attention.

For instance, we have now a tremendous rate advance, when the Interstate Commerce Commission had barely granted any advances before, and then apparently rather grudgingly. Satisfactory results follow. It will not do to maintain that similar results would have followed if rate advances had been granted under the old regime. There was no public control provided for the spending of such increased revenue as might be authorized. To-day the Government prescribes precisely how much shall be spent in wages, how much in rolling stock and how much in other improvements. These and many other matters should be considered by thinking men now, or they will regret later that they have not fortified themselves to form clear opinions as to what ultimately should be done with the railroads. How deep has been the confusion of thought and how idle have been some of the conclusions reached in considering the case of the railroads thus far is well illustrated by certain charges that were made in some quarters last winter. One of these was that before the Government took charge of the railroads the railroad managers were purposely failing to conduct their work efficiently, in order to force control by the Government, while another charge afterward, when the Government had taken control and weather conditions produced still worse congestion, was that the railroad managers were "lying down" in order to discredit control by the Government. Both charges could not be true, and, of course, neither of them really was.

If these extremely important chapters in railroad history that are now being written are not studied carefully in the light of the attendant circumstances, while the latter are readily seen, we may find ourselves in as bad a muddle after the war as to what to do with the railroads as we certainly were in before this experiment of Government control was undertaken.

Commenting on the hearings at Washington, designed to aid in the framing of the new war tax bill, the New York *Times* says:

> In banking circles there is little disposition to become concerned with the hearings which are preliminary to the drafting of new tax legislation. Against suggestions of the kind advanced by Professor Sprague, including recommendations for a tax of 10 cents a pound on coffee, 3 cents a pound on sugar, and 100 per cent on the present selling price of gasoline, the more sober view of practical men could hardly hope to attract attention.

The manufacturers and merchants of the country will make a mistake if they allow professional economists to have too large a share of

attention from the committees engaged at Washington in re-forming the present jumble of tax laws. The article in THE IRON AGE of June 20 by William B. Dickson, vice-president of the Midvale Steel & Ordnance Co., is an example of the kind of contribution business men should make to current thought on this vastly important issue. The war appeal is to every citizen to do his part and to every organized interest to do its part. That means that manufacturers should abandon forthwith the rôle of objectors to proposed legislation, in which they have so often appeared, and instead come forward with definite proposals of a constructive character.

Workmen's Compensation Insurance

Governor McCall of Massachusetts has vetoed a bill providing for self-insurance by employers under the Workmen's Compensation Act, and the majority of the legislature favoring the measure was not large enough to override the veto. In all but a few of the States owners are given the option between self-insurance and insurance in companies organized to carry compensation risks, the former plan being safeguarded by a system of bonding which secures for the workers complete protection in case of the financial disability of employers. So far as can be learned no hardship has resulted anywhere on account of self-insurance. It is very much cheaper, because a large per cent of the amount of premiums paid the insurance companies represents the cost of maintaining the system. Nevertheless, organized labor and other interests have always opposed vigorously the acceptance of self-insurance in Massachusetts.

The general contention of the opposition is that were an injured workman obliged to bring suit against his employer, in the adjustment of his claim he would not fare so well as he would in litigation with an insurance company, chiefly because workmen would not dare to testify in favor of the injured man with the same freedom as if the defendant were an insurance company.

Workmen probably do not realize that the large employers have gone much farther than the average small establishment in welfare undertakings. And it is the larger employers, as a rule, who desire to insure themselves under workmen's compensation. To take advantage of the privilege, by the use of what has been termed the "silent coercion" of workers, would be utterly antagonistic to the accepted maxim that square dealing pays.

In Massachusetts, as in other States, workmen's compensation had been established by private industries before it was embodied in legislation. Some of the larger industries had adopted it, not as a substitute for employers' liability, as it is to-day under the law, but for the benefit of employees who sustained injuries for which damages were not recoverable under employers' liability. The purpose was to benefit injured employees by organized relief, that they and their dependents might suffer no privation because of the enforced idleness, and at the same time might feel that they were receiving not charity but compensation which they had earned. Had the various States declined to accept workmen's compensation there is little doubt that it would have been adopted by large employers of labor, and by some not so large, until it would have been an important factor in industry, for the same reason that other systems not compelled by statute have been established to relieve the worker of the burdens of sickness and injury. In view of this well-established tendency there is little ground for the fear expressed by Governor McCall in his veto of the self-insurance bill that "the friction likely to be evolved between the employees and the employers would much more than offset any saving there might be in insurance."

Tin Plate and War

It would have been an egregious blunder, from the viewpoint of peace times, if the American tin plate industry had not been established, but the blunder would have been many times as injurious in this period of war. The American tin plate industry, grown until it far outstrips the parent Welsh industry in size, is helping out by supplying many countries hitherto supplied by the mills in Wales; and while the Welsh industry is, by force of war conditions, operating at a much lower rate than normal, the American industry is breaking records in tonnage. Last year's output was 20 per cent above the previous record, and this year's tonnage promises to eclipse that of last year by between 5 and 10 per cent. In itself the industry is capable of doing still more, but it was badly handicapped, as to making a new record this year, by the traffic blockade of last January and February.

It was not until the Spanish-American war, 20 years ago, that the value of tin plate as a war munition was recognized. Canned food then proved its usefulness in the training camp and in the field, although the field was but a short distance from our shores. In the present war tin plate is vastly more useful, for it permits the convenient transportation of food to great distances. It does much more than that, for it conserves a vast quantity of food that otherwise would not be produced or could not be saved.

In many households canned food proves in present conditions to be an economy, not a luxury. It is remarkable that with the heavy domestic demand for canned food, and with the enormous demand of the war machine, there should be no shortage of tin plate, yet such is substantially the case. A very large increase in the supply for the canning of the perishable foods is provided by the double influence of the greatly increased capacity of the past two years and the diversion of much tin plate, at least during the summer, from the less essential uses to this thoroughly essential one of preserving food. Undoubtedly more food could be canned than will be, but the neck of the bottle is not the supply of tin plate for making cans, but the supply of food for putting in them.

It is an interesting fact that in the various orders by which the Government has controlled the supply of steel and other products tin plate

has occupied a very inconspicuous place, and yet there is no product that has been so long and continuously under control, for war purposes, as tin plate. The situation arose from the fact that even before war was actually declared an arrangement was entered into between Secretary Redfield and the tin plate manufacturers whereby everything that could be conceived and compassed was done to stimulate the production of tin plate and husband the supplies for helping the prosecution of the war. Great credit is due to Secretary Redfield for his foresight and to the tin plate manufacturers for their eager and intelligent cooperation.

Tin plate, once a specialty and not regarded as a "tonnage" proposition like rails and other much less finished forms of steel, now rolls up a very formidable tonnage. Before the American industry was established by the McKinley protective duty which became effective July 1, 1891, the imports, all from South Wales, had reached a trifle more than 300,000 gross tons a year. In 1898, seven years after the protective duty was imposed, the domestic production equalled the former rate of import. In 1910 the 600,000-ton mark was passed. Last year the output was about 1,500,000 tons and this year's output promises to be about 1,600,000 tons.

While tin plate is spoken of in the parlance of the steel trade as having become a "tonnage product," it is, as a matter of fact, not sold by weight, invoices being in base boxes, a base box involving 31,360 sq. in., the area of a box of 112 sheets, each 14 x 20 in. in size. The production forecasted for the current year is 36,000,000 base boxes which, as weights run, will mean about 1,600,000 gross tons. While the tonnage is impressive, the area is still more so, for 36,000,000 base boxes means almost precisely 180,000 acres, the factor being approximately 200 base boxes per acre. Roughly speaking, 2½ base boxes of tin plate are required to make 1000 two-pound cans, so that this year's output, if all made into two-pound cans, would make nearly 15 billion cans, or 150 per capita of population. The amount actually used in packing the perishable food crops is less than half the total supply, some portion of the remainder being used in packing other foods, including condensed milk, in which the war requirements are extremely heavy.

An interesting industrial exhibit which is worthy of consideration by public institutions in other industrial localities has been established in the Newark Public Library, Newark, N. J. It is an exhibition of the resources and needs of Colombia, South America, and is calculated to point out the desirability of bringing from that country the things which we need and of sending to that country the things which it wants. These listed in the case of Colombia include railroad material, especially for street systems, hydroelectric plants, machine shops and foundries, agricultural machinery, automobiles, trucks, plumbers' supplies, metals and hardware. The exhibit, it is emphasized, has the indorsement of the President of the United States, the Colombian Minister to the United States, and that country's consul-general to New York. It is to remain open until November.

CORRESPONDENCE

The Collection of Old Material

To the Editor: Referring to the letter sent out under date of June 12 by W. Vernon Phillips, chairman of the Sub-committee on Scrap Iron and Steel of the American Iron and Steel Institute, to the members of the American Board of Scrap Iron Dealers, located all over the country, it is desirable to point out that the Government cannot be successful in obtaining the collection of scrap to the maximum degree without the co-operation and support of all persons engaged in or interested in the iron and steel industry. This applies to the producer and consumer alike; in fact, to anyone handling iron and steel products of any description whatsoever.

Quite obviously, there must be a source of supply for scrap since it is not mined or produced like ore, so if the producer or holder of scrap iron does not do his bit by making his scrap available for marketing, the dealer or operator in scrap iron is naturally without material for supplying the demands that are made on him, which are exceedingly heavy at the present time, from the mills who look to him as the means of supply for their requirements of scrap iron.

The bulk of our country's war needs, which we all know are stupendously large, is represented in iron or steel—for the manufacture of shells, torpedoes, cannons, rifles, ships, wagons, railroad cars, etc.—in fact, iron or steel is always present in some form in all war accessories. It should be strikingly evident from this that it is the duty of all having the interest of our country sincerely at heart to facilitate the accumulation, movement and marketing of all iron and steel in scrap form, because the use of scrap iron represents a very important part of our iron and steel business, and without scrap they cannot produce the things that our country must have to win the war. Therefore, your readers, who constitute the bulk of the producers of scrap iron in this country, should be everlastingly mindful of the importance of scrap iron to our country during this critical period and lend their aid and co-operation in facilitating the movement and marketing of all scrap under their control. In fact, it is the patriotic duty of all of us to go even further, going outside of our regular sphere of activity for locating late accumulations of scrap iron and report these to the scrap concerns with whom they are acquainted for the purpose of getting this scrap to the market. This would take in old buildings, factories, structures, bridges, mines, railroads, machinery, or anything else that possessed nothing but a scrap value.

If your readers will give this their attention; in other words, if they will be alert, they will be surprised at the numerous lots of scrap iron that they will be able to locate, the movement of which is either being overlooked or neglected, because (speaking from experience) there is a lot of scrap iron in this country which never reaches the market and which eventually wastes away from want of attention, and if this waste can be avoided a whole lot would be accomplished toward supplying our iron and steel mills with the scrap they need for our Government's requirements of iron and steel products.

Scrap iron of all forms possesses some kind of a value, because the prices of all grades of scrap iron to-day are sufficiently high to justify some value for it, regardless of the shape or form that it may be in, or its location. If all of the iron and steel in this country in the form of scrap were marketed there would be no shortage, because in the cycle of iron and steel operations the consumption of scrap is not equal to the production of new iron and steel. In fact, the dis-

crepancy of the ratio is probably around 25 per cent or more.

The slogan "Sell Your Scrap" should be nationally adopted. Speaking for the dealers engaged in the scrap iron business, we wish to say it is our sincere belief that if the entire country—taking in persons in all walks of life, including even children and also the assistance of publicity from all newspapers, magazines, etc.—gives proper attention, similar to that which is given to the sale of Liberty Bonds, Thrift Stamps and Red Cross donations, there will be plenty of scrap for all needs, which will mean plenty of iron and steel for our Government.

The newspapers of Chicago have already given the matter of bringing this city's accumulation of all classes of scrap iron and junk to the market, publicity that is worthy of considerable commendation, and the movement is receiving the co-operation and assistance of the city scrap men who are paying for the scrap with War Thrift Saving Stamps. The schools are also behind the movement and in numerous cases the proceeds from the sales of scrap iron are donated to the Red Cross.

We trust that the slogan mentioned will be nationally adopted, and that all of your readers will bear in mind the old adage that "Every Little Bit Helps."

BRIGGS & TURIVAS.
Frank B. Parker, General Manager.

Eighty-nine Launchings on July 4

WASHINGTON, June 25.—On July 4 American shipyards operating under the United States Shipping Board and Emergency Fleet Corporation will celebrate the day by launching 89 hulls having a total deadweight tonnage of 439,886, according to a bulletin made public by the board. This is about one-third more than was the production of sea-borne tonnage from American shipyards in the fiscal year 1915-1916, and exceeds by 42,050 deadweight tons the launchings for the entire year of 1901, which was the record pre-war year in American shipbuilding. The launchings set for the Fourth will exceed by 18 the number of hulls and by 95,436 deadweight tons the amount of tonnage launched during the month of May, when 71 hulls, totaling 344,450 deadweight tons, took the water, and setting a new high mark for launchings in the United States. In addition, work on five other hulls is being rushed and yesterday's report indicated that they may be made ready in time to slide down the ways with the others. These would add 23,500 tons to the total.

The 37 steel hulls which have been definitely scheduled to go overboard on July 4 have a total tonnage of 254,686, and will include the 12,500-ton cargo carrier William Penn, the 12,000-ton Challenger of the same type, the three burly sisters, Independence, Victorious and Defiance, all of the 11,800-ton class; three refrigerating ships of 9400 tons each; eight of the 8800-ton freighters, and so on down the list. The suggestion of Edward N. Hurley, chairman of the United States Shipping Board, that American shipbuilders commemorate this year's Fourth of July by launching from their ways as many ships as possible had the enthusiastic support of Director General Schwab, who threw all of his amazing energy into the work of making the Independence Day launchings the most notable of any.

New Priority Rulings

WASHINGTON, June 25.—The hardware and hand tool section of the War Industries Board announces that the Priorities Board has issued a blanket priority with a fairly high classification covering all steel for use in woodworking tools and small tools. Steel mills have been notified to this effect.

The War Industries Board is contemplating the cancellation of all priorities on high speed and other tool steels. Final action has not yet been taken, but officials of the priorities committee are advised that priority on high speed and other tool steels is no longer necessary.

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Seaboard Steel and Manganese Corporation

A reorganization of the Seaboard Steel & Manganese Corporation has been effected following the purchase of a considerable portion of its stock by new interests. This change was coincident with the election of new officers and members of the board of directors. Hartley C. Wolle, formerly president, and Lester Ussing of the board have retired from the company. Milford Worthen, formerly vice-president, and F. B. Spaulding, auditor, have retired from the directorate. The new officers are William R. Hopkins, president; Charles M. Smith, president and treasurer Colonial Iron Co., Singer Building, New York, vice-president; Granville W. Mooney, remaining as secretary and treasurer. The new board of directors is composed of D. Fairfax Bush, Crocker Brothers, pig iron merchants, New York; August Heckscher, director New Jersey Zinc Co.; E. J. Lavino, and H. Harry Meyers. Mr. Worthen remains as furnace superintendent at Temple, Pa., where the company will start its No. 2 stack soon after July 4. No. 1 furnace will be relined immediately thereafter. The new furnace is rated to produce 275 to 300 tons foundry iron daily or 140 to 150 of spiegeleisen, or 75 to 80 tons standard ferromanganese. Headquarters of the company are at 50 East Forty-second Street, New York.

Receivers of the United States Electric Steel Co., Pittsburgh, have been given permission by the United States District Court to enter into an arrangement with the Jessup Steel Co., Washington, Pa., by which the latter will lease and operate the plant of the former concern at Connellsville, Pa., for an indefinite period. The Jessup company will pay the receivers $1,000 per week, and bear all costs of operating, labor, maintenance and raw materials.

Lake Superior Ore Advanced 45 Cents

Chicago Basing on Bars, Shapes and Plates Eliminated—A Special Committee on Prices of Rails, Castings and Other Products

WASHINGTON, June 25.—The existing schedule of controlled prices for iron ore, pig iron and steel products will be continued for three months from July 1, except that Lake Superior iron ore will be advanced 45c. per gross ton, subject to any changes in freight rates that may be made hereafter, and the sole basing point for steel bars, shapes and plates will be Pittsburgh, Chicago being eliminated. These decisions, reached at a protracted conference between representatives of the ore, iron and steel producers and of the Government, held on June 21, were promptly accorded the President's approval, and were thereupon promulgated by the War Industries Board in the following bulletin:

The President has approved the agreement made by the Price Fixing Committee of the War Industries Board with the representatives of the iron ore, pig iron and steel interests, that the maximum prices now prevailing on iron ore, pig iron and iron and steel products be continued in effect for the three months ending Sept. 30, 1918, with the following exceptions:

1. Lake Superior Iron Ore:

Base prices of Lake Superior iron ore delivered to lower Lake ports are increased 45c. per gross ton on and after July 1, 1918, subject to the following condition: These increased prices are based on the advances in rail freight rates effected June 25, 1918, and on the present Lake rates and in the event of any increase or decrease in either rail or lake rates said prices shall be increased or decreased accordingly on all deliveries made during the continuance of such increased or decreased freight rates.

2. On and after July 1, 1918, the basing point for steel bars, shapes and plates will be Pittsburgh, Pa.

No new contracts calling for delivery of any of the above commodities or articles on or after Oct. 1, 1918, are to specify a price unless coupled with a clause making the price subject to revision by any authorized United States Government agency, so that all deliveries after that date shall not exceed the maximum price then in force, although ordered or contracted for in the meantime. It is expected that all manufacturers and producers will observe the maximum prices now fixed.

Special Committee on Rails, Castings, Etc.

Following the conference, Chairman Brookings of the Price Fixing Committee appointed a special subcommittee composed of Director of Steel Supply Replogle, H. B. Spencer of the Railroad Administration, Commander S. R. Fuller, representing the Navy Department, and Capt. W. M. MacCleary, buyer of steel for the Ordnance Bureau, to negotiate with the Committee on Steel and Steel Products of the American Iron and Steel Institute for the fixing of prices on steel rails, steel castings, malleable castings, wire rope and certain other unspecified articles. The special committee will take this matter up with the institute at an early date, and the prices on the articles referred to will be promulgated as soon after July 1 as possible.

Large Ore Representation

The meeting drew the largest gathering of men prominent in the iron and steel industry that thus far have attended the conferences with the War Industries Board, the contingent of ore producers swelling the number materially. In addition a number of Minnesota State officials interested in the ore leases were also on hand, although they were not permitted to participate in all the deliberations. Those present at the meeting included the following:

Judge E. H. Gary, chairman; J. A. Farrell, president, and W. J. Filbert, comptroller, United States Steel Corporation; E. A. S. Clarke, president Lackawanna Steel Co.; E. G. Grace, president Bethlehem Steel Corporation; A. C. Dinkey, president Midvale Steel & Ordnance Co.; Willis L. King, vice-president Jones & Laughlin Steel Co.; A. F. Huston, president Lukens Steel Co.; J. A. Campbell, president Youngstown Sheet & Tube Co.; L. E. Block, Inland Steel Co.; Francis J. Hall, Central Iron & Steel Co.; H. G. Moore, Keystone Steel & Wire Co.; James A. Burden, Burden Iron Co.; H. L. Round, Republic Iron & Steel Co.; Clarence H. Howard, Commonwealth Steel Co.; Thomas K. Glenn, Atlantic Steel Co.; W. G. Mather, Cleveland-Cliffs Iron Co.; J. V. W. Reynders, chairman of the Association of Steel Makers in Class 3; W. V. Phillips, chairman sub-committee on scrap iron and steel; W. H. Smith, Tennessee Pig Iron Association; James Bonner, representing the American Iron and Steel Institute; A. A. Fowler, Rogers, Brown & Co.; R. A. Rainey and Scott Stewart of W. J. Rainey; C. D. Dyer, W. P. Snyder & Co.; W. L. Tinker, secretary Lake Superior Iron Ore Association; J. D. Ireland, M. A. Hanna & Co.; John A. Savage, John A. Savage & Co.; H. G. Dalton, Pickands, Mather & Co.; M. Andrews and C. N. Turner, Newport Mining Co.; O. B. Warren, Mace Iron Mining Co.; T. D. Heed, Judson Mining Co.; E. W. Mudge, E. W. Mudge & Co.; G. A. Sinclair, Section No. 30 Mining Co.; M. Dalton, Isabella Mining Co. In addition, R. C. Allen, State Geologist of Michigan; B. D. Burtler, secretary of the Michigan State Board of Tax Commissioners; J. A. O. Preus, State auditor of Minnesota, and several other Michigan and Minnesota State officials were in attendance.

The Government was represented by Bernard M. Baruch, chairman of the War Industries Board; R. S. Brookings, chairman of the Price Fixing Committee; J. Leonard Replogle, Director of Steel Supply; Jay C. McLauchlan, pig iron expert; Capt. W. M. MacCleary, steel purchaser for the Ordnance Bureau; Paul Mackall, assistant to Mr. Replogle; George N. Armsby, chief of Tin Section; Judge A. C. Ritchie, legal adviser of War Industries Board; Dr. F. W. Taussig, chairman United States Tariff Commission and member of Price Fixing Committee; Hugh Frayne, labor representative of War Industries Board; Alexander Legge, chief of Requirements Division, War Industries Board, and Messrs. Dillon, Alt, Walker, Wooster and Wells of the Federal Trade Commission.

No Finished Steel Advance

While the ore markets are credited with a notable victory, and some surprise has been expressed that the steel men did not make a fight for higher prices, the fact is that the War Industries Board, although approaching the conference with what was said to be an open mind, had practically determined in advance that no increases would be allowed on steel, although due attention would be given to any representations that might be made respecting the effect of the recent action of the Railroad Administration in raising freight rates. It is an interesting fact that for several days before the meeting on June 21 there was a revival of the discussion which began many months ago concerning the advisability of the adoption of the so-called Willard plan under which the Government would take over the output of the various producers at prices representing cost plus a reasonable profit, pool the entire production, and after commandeering the Government's supply sell any residue to private parties at a flat price. The principal argument in favor of the adoption of this plan was the fact that it would enable the Government to give the small producers a fair profit and thus stimulate maximum production without adopting a universal price that would enable the big, fully integrated concerns to make exorbitant gains. So freely was this matter discussed prior to the meeting on June 21 that it came to the ears of many of the steel men and pro-

duced such a feeling of uneasiness that the decision reached to continue the old schedule of prices must have come as a distinct relief to their anxiety.

The Revenue Aspect of Steel Prices

It is also an interesting fact that for some time before the meeting members of the War Industries Board canvassed the question of the desirability of continuing the existing steel price schedule or of advancing certain important items, basing such action on the fact that Congress is now framing what is expected to be a very drastic revenue bill that will materially increase excess profits taxes of all the prosperous corporations. In reply to a question, Chairman Baruch recently expressed the opinion that the work of Congress would to a material extent render the task of the Price Fixing Committee in attacking all of its more important problems "simpler and easier." At the same time he pointed out that the Government, while the principal consumer of steel and several other important commodities, is not the only user, and that in all price-fixing arrangements the War Industries Board occupies the position of trustee for the public, and cannot do its full duty if it approves unnecessarily high prices, counting upon the operation of the revenue laws to reimburse the Government for the payment of such prices.

The Ore Advance

In view of these considerations there was little prospect for any important advances in the controlled price list when the conference began its deliberations. The steel men had had a private meeting at their hotel before going to the headquarters of the War Industries Board, and had decided against any general aggressive attempt to raise prices. They had, however, listened with sympathetic ear to the representations of the ore producers that a concession must be obtained by them to offset the recent increase in freight rates and the rapidly mounting labor cost.

The meeting did not convene until nearly 11.30 a. m., and after an hour and a half of discussion devoted chiefly to the ore situation, freight rates and labor, a recess was taken at 1 o'clock until 2.30. The ore men came back into the conference in a very aggressive mood, and under the leadership of John A. Savage began a hard battle for an advance sufficient to put the ore industry in the same relative position it occupied when the price of Lake Superior ores was fixed last September at $5.05 per gross ton. The discussion waxed so warm that Chairman Brookings divided the meeting, sending into a neighboring room the ore men, whom he subsequently joined. When the meeting reassembled Mr. Savage stated the case of the ore producers in very vigorous terms, and to such purpose that it was soon decided to concede a 45c. advance.

In connection with the plea of the ore men, J. A. O. Preus, State auditor of Minnesota, explained the existing situation in the upper peninsula substantially as follows:

"No fair-minded man familiar with the facts would hesitate to grant an advance in the price of Lake Superior ores. As an officer of the State of Minnesota I have felt it my duty to advocate an increase for reasons which will appeal to any business man. The State has an important interest in the matter, for we derive a royalty of 25 cents per ton on all iron ore produced. About 40 per cent of current output is now mined by independent producers and on this they must pay an increase in freight rates of 30 cents per net ton and in addition must stand a heavy advance in labor costs. At the present time common labor in the mines is receiving $4 a day and this extraordinary figure is of course reflected in the average cost of production. I do not think the increase of 45 cents asked by the ore men will more than offset their increased expenses."

No More Chicago Basing

Following the decision with respect to the ore advance the conference discussed steel prices in general terms, but it was soon made clear that the steel men were not prepared to make a last-ditch fight for higher rates. The pig-iron men pointedly suggested the desirability of the adoption of an f.o.b. Valley basis to offset the increase in freight rates, but this point was not strongly urged. The feature of the closing discussion, however, was the importance, in view of changed conditions, of substituting Pittsburgh for Chicago as the basing point for steel bars, shapes and plates. The steel men have held Mr. Replogle responsible for the fixing of the Chicago base in the existing schedule, and the Director of Steel Supply is not disposed to shirk the responsibility; in fact, he justifies the original arrangement in emphatic terms, and declares that the Government has probably saved between $10,000 000 and $15,000,000 as the result of Chicago basing. When this arrangement was made, however, according to Mr. Replogle, the big Eastern producers were shipping but 5 or 10 per cent of their product west, and were, therefore reaping an advantage on the Eastern shipment of 90 to 95 per cent of their output that much more than offset the penalty of Chicago basing on a fraction of their shipments. Within the past month, however, an important change has taken place, largely as the result of the great expansion of the rolling-stock program of the Railroad Administration, which has placed large contracts for plates and other material with some of the Eastern concerns which are to be shipped west. Also, mills east of Ohio will be expected to furnish large amounts of ship plates to yards on the Pacific coast, in view of the fact that Chicago district mills are already well filled on such material. The equilibrium of the situation has thus been disturbed, and Mr. Replogle was, therefore, ready to accede to the urgent demand of certain of the steel men to restore the Pittsburgh basing on all bars, shapes and plates.

Chairman Brookings is authority for the statement that no other changes are to be made in the price schedule. The items which are to be considered by the subcommittee of which Mr. Replogle has been appointed chairman are not included in the regular schedule of controlled prices, and, with the exception of wire rope, have not been covered by differentials heretofore worked out by the American Iron and Steel Institute. Although the agreement reached with respect to the price of Lake Superior ores provides that any further increase in rail or Lake rates shall be compensated for by corresponding advances in the ore price, it is the opinion of members of the War Industries Board that no change in the freight tariffs in the ore regions will be made before the new schedule expires on Sept. 30 next.

Steel Requirements to Be Closely Scanned

The War Industries Board has served notice on the War and Navy departments, the Shipping Board, and generally throughout the purchasing bureaus of the Government, that all estimates of steel consumption must be closely scanned and pruned, not only with reference to the actual requirements of the Government but with respect to its capacity to use the material promptly if delivered according to schedule. Chairman Baruch is giving his personal attention to this phase of the subject, and is emphasizing the fact that every pound of steel ordered for the Government which is not actually needed, or which will not be required on the specified date, must be taken from the small residue of surplus steel upon which all the industries of the country are now compelled to rely. A single ton of steel unnecessarily ordered by the Government may mean the ruin of a small but relatively important industry, and Mr. Baruch desires that the officials who are handling the stupendous figures representing the al-

(*Continued on page* 1705)

Iron and Steel Markets

ADVANCE IN IRON ORE ONLY

Pig Iron and Steel Prices Are Unchanged

Certain Adjustments Yet to Be Made—Some Complaint on Pig Iron

The price conference at Washington last Friday moved on the lines of least resistance in raising Lake Superior ore 45c. per ton and reaffirming existing prices on pig iron and finished products for three months from July 1. It was made plain that the ore advance was absorbed by the new higher freight on ore and by other new railroad charges, and that higher labor cost was not compensated.

A minority of smaller producers of pig iron is disappointed that its claims for an advance were not urged by the general iron and steel committee, and an occasional note of protest has gone up in other quarters. But the larger interests, before the conference met, had accepted the well-understood Washington view that pig iron and finished steel prices should not be disturbed.

As a foil to any agitation for higher schedules, new currency was given in Government circles to the proposal for a Government pool, taking in the entire output of finished steel, purchases to be made at differing prices representing cost plus, while sales to the public were to be at flat prices. This wa an apparent offset to the claims of dwindling profits put forth by the smaller mills in plate and other lines.

It remains to be seen to what extent the predicted shutdowns of Tennessee and Virginia blast furnaces, on the score of prohibitive costs, will be realized. The possibility is held out of some adjustment in extreme cases by the general committee.

The disappearance of Chicago as a basing point for bars, plates and shapes is an important outcome of the Washington conference. The 25 per cent freight advance adds to the advantage a sole Pittsburgh basing brings to Central Western and Eastern mills that for nine months have had to absorb freights to Chicago. The change was due in part to the fact that Chicago mills are loaded up, so th 200,000 tons of ship steel for the Pacific coast must be rolled in Youngstown, Pittsburgh and farther eastern mills.

It is not overlooked that the Government and its Allies as the takers of the bulk of the country's steel output for some months will be taxed in no small degree by the new freight rates on finished steel.

A special sub-committee appointed by the Pr Fixing Committee will now take up with the steel trade the fixing of prices on steel rails, steel and malleable castings, wire rope and some other products. No price has been fixed on rails thus far because the railroads wanted none; now the roads are asking for it. Rail requirements for operations in France the coming year have been put as high as 275,000 tons.

Some shipbuilders are giving notice that the flow of plates to their yards is greater than they can accommodate. However, if the mills answer the call of the Emergency Fleet Corporation for a reservoir of 500,000 to 750,000 tons of plates, represented by the total in yards and in transit to and from fabricators, the weekly output of 50,000 tons may require to be kept up longer than has been predicted .

Priorities on high-speed and other tool steels are likely to be canceled as being no longer necessary, though final action has not been taken by the War Industries Board. A blanket priority with a fairly high classification has been issued covering all steel for use in woodworking tools and small tools.

Since the Government buys iron bars in only a limited way, some iron rolling mills are in position to take commercial orders and make deliveries within 90 days. There is a question in this connection as to the maintenance of 3.50c. at Pittsburgh for bar iron, with steel bars continuing at 2.90c.

Largely for construction in France, orders for about 60,000 tons of blue annealed, black and corrugated sheets have just been placed with the mills. Official estimates of similar needs for the coming year run above 100,000 tons.

An interesting war development from the foundry standpoint is that the Ordnance Department has framed a specification for semi-steel projectiles.

With no definite system of pig-iron priorities, furnace companies are making shipments largely to foundries working in essential lines. Contract deliveries are going by the board in many cases and other foundries designated from Washington are getting iron. England's order for 180,000 tons of basic iron, to be shipped in September, October and November, is likely to be divided between the North and the South. If silicon tolerance is raised to 1.25 per cent the South can take more, with the advantage of shipping from Southern ports.

Pittsburgh

PITTSBURGH, June 25.—(*By Wire*).

The advance of 45c. per ton on all Lake Superior iron ores, and the reaffirming of prices on coke, pig iron and iron and steel products by the War Industries Board at Washington last week, were the only new developments of an otherwise very quiet week. The action of the War Industries Board in reaffirming prices on pig iron and finished steel products was no surprise to the trade, as no general advance was expected, and the action of the board in putting up ore 45c. per ton was not a surprise, in view of the very strong case made out by the ore producers at their meeting in Chicago recently. At that meeting the ore producers showed that unless some relief was extended to owners of shaft mines by giving them higher prices for their ore they would either have to shut down their mines or mine and market their ore at a loss. The Government did not want to adopt any policy that would cut down production of ore which is so essential in the manufacture of war materials, and with such a strong case presented the War Industries Board was not slow in deciding an advance was neces-

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

	June 25 1918	June 20 1918	May 28 1918	June 27 1917
Pig Iron, Per Gross Ton:				
No. 2 X, Philadelphia	**$34.40**	$34.25	$34.25	$50.75
No. 2 Valley furnace	33.00	33.00	33.00	53.00
No. 2 Southern, Cin'ct	**36.90**	35.90	35.90	47.90
No. 2, Birmingham, Ala.	33.00	33.00	33.00	45.00
No. 2 furnace, Chicago*	33.00	33.00	33.00	55.00
Basic, del'd, eastern Pa.	**32.90**	32.75	32.75	50.00
Basic, Valley furnace	32.00	32.00	32.00	50.00
Bessemer, Pittsburgh	**36.60**	36.30	36.15	55.95
Malleable Valley	33.50	33.50	33.50	53.00
Malleable Bess., Chicago*	33.50	33.50	33.50	55.00
Gray forge, Pittsburgh	**33.40**	33.10	33.10	47.95
L. S. charcoal, Chicago	**37.85**	37.50	37.50	57.00
Rails, Billets, etc., Per Gross Ton:				
Bess. rails, heavy, at mill	55.00	55.00	55.00	38.00
O.-h. rails, heavy, at mill	57.00	57.00	57.00	40.00
Bess. billets, Pittsburgh	47.50	47.50	47.50	100.00
O.-h. billets, Pittsburgh	47.50	47.50	47.50	100.00
O.-h. sheet bars, P'gh	51.00	51.00	51.00	105.00
Forging billets, base, P'gh.	60.00	60.00	60.00	125.00
O.-h. billets, Philadelphia	**51.30**	50.50	50.50	110.00
Wire rods, Pittsburgh	57.00	57.00	57.00	95.00
Finished Iron and Steel, Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia	**3.73**	3.685	3.685	4.659
Iron bars, Pittsburgh	3.50	3.50	3.50	4.75
Iron bars, Chicago	3.50	3.50	3.50	4.10
Steel bars, Pittsburgh	2.90	2.90	2.90	4.50
Steel bars, New York	**3.145**	3.095	3.095	4.669
Tank plates, Pittsburgh	3.25	3.25	3.25	9.00
Tank plates, New York	**3.495**	3.445	3.445	9.169
Beams, etc., Pittsburgh	3.00	3.00	3.00	4.50
Beams, etc., New York	**3.245**	3.195	3.195	4.669
Skelp, grooved steel, P'gh.	2.90	2.90	2.90	4.00
Skelp, sheared steel, Pgh.	3.25	3.25	3.25	6.00
Steel hoops, Pittsburgh	3.50	3.50	3.50	5.25

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

	June 25 1918	June 20 1918	May 28 1918	June 27 1917
Sheets, Nails and Wire, Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 28, P'gh.	5.00	5.00	5.00	8.00
Sheets, galv., No. 28, P'gh.	6.25	6.25	6.25	9.75
Wire nails, Pittsburgh	3.50	3.50	3.50	4.00
Cut nails, Pittsburgh	4.00	4.00	4.00	4.65
Fence wire, base, P'gh.	3.25	3.25	3.25	3.95
Barb wire, galv., P'gh.	4.35	4.35	4.35	4.85
Old Material, Per Gross Ton:				
Carwheels, Chicago	$29.00	$29.00	$29.00	$43.00
Carwheels, Philadelphia	29.00	29.00	29.00	35.00
Heavy steel scrap, P'gh.	**29.00**	28.50	28.50	45.00
Heavy steel scrap, Phila.	29.00	29.00	29.00	39.00
Heavy steel scrap, Ch'go.	29.00	29.00	29.00	39.00
No. 1 cast, Pittsburgh	**29.00**	28.50	28.50	38.00
No. 1 cast, Philadelphia	29.00	29.00	29.00	39.00
No. 1 cast, Ch'go (net ton)	**27.50**	27.00	26.50	32.00
No. 1 RR. wrot, Phila.	34.00	34.00	34.00	57.00
No. 1 RR. wrot, Ch'go (net)	29.75	29.75	29.75	44.00
Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt	$6.00	$6.00	$6.00	$13.00
Furnace coke, future	6.00	6.00	6.00	9.50
Foundry coke, prompt	7.00	7.00	7.00	14.00
Foundry coke, future	7.00	7.00	7.00	10.00
Metals, Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York	23.50	23.50	23.50	32.50
Electrolytic copper, N. Y.	23.50	23.50	23.50	32.50
Spelter, St. Louis	**8.37½**	7.75	7.25	9.12½
Spelter, New York	**8.62½**	8.00	7.50	9.37½
Lead, St. Louis	7.75	7.75	6.85	11.50
Lead, New York	7.82½	7.82½	7.05	11.70
Tin, New York	**92.00**	90.00	61.00	62.00
Antimony (Asiatic), N. Y.	*13.00*	13.50	12 25	19.00
Tin plate, 100-lb. box, P'gh.	$7.75	$7.75	$7.75	$12.00

sary. After a good deal of discussion it was fixed at 45c. per ton. This advance, it is understood, covers the increase in freight rates from the mines to upper lake docks, which is 33.6c. per ton, and other charges now made by the Government that did not obtain when the railroads were operated individually, these being for spotting cars, switching, and other service, which with taxes it is figured out will absorb the increase of 45c. per ton in ore. The fact that no advance was made in prices of pig iron has caused a good deal of dissatisfaction among producers, especially merchant furnace operators who buy a good part or all of their ore in the open market. Some of these furnace owners say their costs of making iron in third quarter will leave no profit on the $32 price for basic and the $35.20 price for Bessemer. In the Tennessee district, it is claimed, the cost of making pig iron in third quarter in some cases will be $4 per ton above the Government selling price, and it is not unlikely some furnaces in that district will have to shut down. The advance to modern furnaces in cost of making pig iron in third quarter is figured all the way from $1.50 to as high as $2.40 per ton. Roughly the advance in costs of pig iron are figured 90c. for the ore, 50c. for coke, 12c. for limestone and 6 to 7c. for Government charges. This does not include labor in any way, and some of the Valley furnaces have very high labor costs, these running at some plants to more than $2 per ton. It is evident that only modern furnaces, and those that have all or a large part of their own ore, will be able to make a good profit during third quarter. It has been said that the feeling of the Administration at Washington is that no man should have a dollar more when the war is over, as profits from his business, than he had when the war started. Some of the pig iron men figure they will have less money when the war is over than when it started, if they have to go on making pig iron and selling it on the present basis.

The complete supervision of the steel trade by Washington and the distribution of pig iron, steel and finished steel products, seem to be working out smoothly, and producers are pleased that such rulings have been made, as they are relieved of a good deal of trouble in distributing their products to the best advantage for the Government. As it is now, if the supply of pig iron or steel is reduced or cut off to a consumer, and he appeals to the furnace or steel mill, he is simply referred to Washington and told to seek redress there. Already a good deal of pig iron has been taken from consumers, part at least of whose products are not regarded as war essentials, and the iron shipped to other melters working on strictly war essentials. All doubt as to prices for third quarter is over, and the summer months are expected to witness the heaviest output of pig iron, semi-finished steel and finished steel products that we have had in a long time. The car supply seems ample, coke is moving freely to furnaces, and the only likely drawbacks to heavy output in the next three or four months will be hot weather and shortage in labor supply. The latter is already very serious and will become more so as time goes on. Women are steadily being put into mills and factories doing work that heretofore has been done by men only. This will go on as the war draft takes more men, but so far the results obtained from female labor are said to be very satisfactory.

Pig Iron.—A meeting of what is known as the Cleveland District of the American Pig Iron Association was held in the William Penn Hotel, this city, to-day. C. D. Dyer, president of the American Pig Iron Association, made an address to the furnace owners present in which he defined very clearly the reasons for the action taken at Washington last week, when it was decided not to make any advance in prices of pig iron. He also explained why it seemed fair that the ore producers should have an advance of 45c per ton. There was much dissatisfaction among furnace owners because they did not get an advance in pig iron to go along with the

advance in ore, but after Mr. Dyer had finished his statement the pig iron producers saw the matter in a new light, and recognized that it was not politic to make an advance in pig iron at this time. To have done so, would have disturbed the structure of the whole steel fabric, and this was one thing that it was strongly desired to avoid. A meeting of producers of pig iron from all over the country has been called by H. G. Dalton, chairman of the Sub-committee on Pig Iron, Iron Ore and Lake Transportation to be held in the William Penn Hotel, this city, on Friday, June 28. It is understood this meeting is called for the purpose of explaining to all pig iron producers why no advance in prices of pig iron was made in Washington last week. The distribution of pig iron to consumers is now entirely in the hands of the Government at Washington and seems to be working out quite satisfactorily. Practically no new sales of pig iron are being made and are not likely to be while the present conditions last. Effective June 25, the freight rate on pig iron from Mahoning and Shenango furnaces to the Cleveland and Pittsburgh districts was advanced from $1.10 to $1.40 per gross ton.

Basic pig iron, $32; Bessemer, $35 20; gray forge, $32; No. 2 foundry, $33; No. 3 foundry, $32.50, and malleable, $33.50, all per gross ton at Valley furnace, the freight rate for delivery in the Cleveland and Pittsburgh districts being $1.40 per ton.

Billets and Sheet Bars.—All prices on semi-finished steel were reaffirmed for third quarter by the War Industries Board, and this action was anticipated by the trade. The output of shell steel is heavier now than ever before, and yet very little of it is being offered in the open market. Under the rulings from Washington mills are not allowed to roll shell steel discards unless the material is to be used in making war essentials and nearly all of it is being used for that purpose. There is still an acute shortage in supply of sheet bars and this is not likely to be relieved for some time. There is some inquiry for forging billets and several mills can make quicker deliveries on these now than some time ago. Government prices on semi-finished steel as reaffirmed for the quarter ending Sept. 30.

We quote 4 x 4 in. soft Bessemer and open-hearth billets at $47.50, sheet bars $51, forging ingots $73, and forging billets $60 base, all f.o.b. at mill, Pittsburgh or Youngstown.

Ferroalloys.—Consumers of ferroalloys are pretty well covered on their needs for this year and new inquiry is light. A Mahoning Valley steel interest is figuring on the purchase of 1000 tons of 18 to 22 per cent speigeleisen, and the sale may be closed this week. A Wheeling interest is reported to have bought 500 tons of 70 per cent ferromanganese, delivery over four months, starting July, at $250 per gross ton, delivered. All present prices on ferroalloys have been reaffirmed for third quarter.

We quote 70 per cent ferromanganese at $250 delivered, 16 per cent spiegeleisen at $65 to $70 at furnace and 50 per cent ferrosilicon for prompt shipment at $160 and for delivery over the last half of the year, $150 to $155 at furnace, the furnaces usually absorbing the freight.

We now quote 9 per cent Bessemer ferrosilicon at $54; 10 per cent, $55; 11 per cent, $58.30; 12 per cent, $61.60. We quote 6 per cent silvery iron, $41; 7 per cent, $43; 8 per cent, $45.50; 9 per cent, $47.50; 10 per cent, $50. Three dollars per gross ton advance for each 1 per cent silicon for 11 per cent and over. All the above prices are f.o.b. maker's furnace, Jackson or New Straitsville, Ohio, these furnaces having a uniform freight rate of $2 per gross ton, for delivery in the Pittsburgh district.

Structural Material.—The McClintic-Marshall Co. is rapidly placing contracts for the two new steel ship fabricating plants it is to build, one at Leetsdale, Pa., and the other at Pottstown, Pa., and the company hopes to have these two plants ready for operation by Jan. 1, but it will probably be a later date before they are ready. The Pressed Steel Car Co. is fabricating large quantities of ship plates at its plant at McKee's Rocks, and the Standard Steel Car Co. is doing the same at its plant at Butler, Pa., both at the request of the Government. It is said these three concerns, shortly after Jan. 1, will have new capacity for fabricating about 40,000 tons of ship plates per month. It is stated the Midvale Steel & Ordnance Co. has closed for 5600 tons of steel for its new ordnance plant that it will build for the Government. The American Bridge Co. has taken 900 tons of steel for buildings at the Aberdeen proving grounds at Aberdeen, Md., and the McClintic-Marshall Co. 500 tons for an assembling shop to be built at Camp Perry, Ohio. The Pennsylvania Railroad is in the market for 600 tons of steel bridge work. It is reported the Carnegie Steel Co. has taken about 50,000 tons of small shapes for the cars to be built by the Government by the Pressed Steel Car Co., and the Standard Steel Car Co. We quote beams and channels up to 15 in. at 3c. at mill, Pittsburgh, for third quarter.

Wire Rods.—Local makers report a very active inquiry for both soft rods and high-carbon rods, but two of the largest makers here have no rods to spare, their obligations to the Government on nails and wire being so heavy it is using up practically their entire output of rods. Another concern has sold recently several fair-sized lots of rods, carbons running from 0.70 to 0.80 at prices ranging from $80 to $90 per ton, f.o.b. Pittsburgh. Present prices on rods have been reaffirmed for third quarter, and are given on page 1701.

Wire Products.—The War Department at Washington is in the market for 300,000 to 310,000 kegs of wire nails for shipment to France, deliveries running over eight months, June to February inclusive. Allocations for this large quantity of nails have already been made by the sub-committee on wire products of which Frank Baackes is chairman. One local company has been allocated about 25,000 kegs and another concern 40,000 kegs. There is also an inquiry for 7500 tons of annealed wire for third quarter delivery for shipment to France, and another for 10,000 tons of barbed wire for use in United States, deliveries running 2000 tons per month, starting July. In this inquiry the Government did not specify galvanized barbed wire, but the mills have asked that this kind be used, and the request will likely be granted. Local mills are filled up on nails and wire for three or four months, nearly all the business on the books being direct Government orders, while a small part of the output of nails and wire is being furnished on indirect orders, on which the buyers furnish priority certificates. Several mills state they have not absolutely shut the door in the faces of old customers, but after entirely taking care of Government needs in nails and wire, they feel free to sell whatever part of their product remains to regular customers.

Hoops and Bands.—The demand is reported by the mills to be very heavy, the Government taking close to 100 per cent of the output in both hoops and bands, on direct and indirect orders. The demand for steel hoops for cooperage purposes is especially heavy. Present prices have been reaffirmed for third quarter. We quote steel hoops for cooperage purposes and steel bands at $3.50 per 100-lb. f.o.b. Pittsburgh, for delivery up to September. Extras and differentials on hoops and bands as given on pages 1357 and 1374 in THE IRON AGE of May 23 are also in effect for third quarter.

Plates.—It is expected the Government will be in the market shortly for 50,000 additional cars, and it is understood these are to be allocated to the different steel car companies on the same basis as the 100,000 cars placed some time ago.

Iron and Steel Bars.—The Government is understood to be a very heavy buyer of steel bars for construction work in this country and in France, but is a buyer of iron bars to only a limited extent, so that some of the mills rolling iron bars are in position to take commercial orders for fairly large quantities and make deliveries in about 90 days from date of order. The Carnegie Steel Co. has lately taken 40,000 tons or more of steel bars for new steel cars.

Sheets.—It is stated that the Government has placed within the last week or ten days orders for about 60,000 tons of blue annealed, black and corrugated sheets, largely for new construction work it is doing in France. The allocations for these sheets have not yet been sent out, but will probably be received by the mills within a short time.

Tin Plate.—Last week the War Industries Board at Washington reaffirmed present prices on all grades of tin plate and terne plate for third quarter delivery. Reports that the price of $7.75 per base box on tin plate has been reaffirmed for second half of the year delivery is incorrect. Nothing definite was done in re-

gard to prices for pig tin for third quarter, but a committee has had this in charge for some months, and is expected to work out something definite in a short time.

Cotton Ties.—Government prices on cotton ties have been fixed for third quarter delivery, being $1.93 for July shipment, $1.94 for August and $1.95 for September, per bundle of 45 lb. in lots of 3000 bundles and over, 2c. per bundle being charged for less than 3000 bundles, the price being f.o.b. Pittsburgh. When the cotton tie season opened all makers figured out the quantity of ties they would make this year, and prorated their output among their customers. No prices were fixed for shipment starting July, but the prices named above will rule. We therefore quote cotton ties in lots of 3000 bundles and over at $1.93 per bundle of 45 lb. for July shipment, with 1c. advance for August and another cent for September shipment.

Hot-Rolled Strip Steel.—Makers continue to report a large part of their output, possibly 75 per cent, is going to the Government on direct and indirect orders. The output of hot-rolled strip steel is about 50 to 60 per cent of normal. Prices have been reaffirmed for third quarter.

Cold-Rolled Strip Steel.—The scarcity in supply of steel is cutting down output of cold-rolled strip steel very materially, the average rate of operation of the larger makers not being over 60 to 70 per cent. The Government is a fairly heavy buyer of cold-rolled strip steel on direct and indirect orders. Mills now require that all customers must furnish priority certificates when sending in orders, showing that the material is to be used in making war essentials. The present price on cold-rolled strip steel has been reffirmed for third quarter. We quote cold-rolled strip steel at $6.50 per 100 lb., f.o.b. Pittsburgh, terms 30 days, less 2 per cent for cash in 10 days when sold in quantities of 300 lb. or more. Freight allowed to destination when it does not exceed 31c. per 100 lb.

Shafting.—Makers continue to report that 85 to 90 per cent of the present limited output of shafting is going to the Government on direct and indirect orders. Jobbers are having also a fairly large trade, but are selling shafting only to concerns that show it is to enter into the manufacture of war essentials. Up to Sept. 30 the discount on cold-rolled shafting in carloads is 17 per cent off list and 12 per cent in less than carloads, f.o.b. Pittsburgh.

Nuts and Bolts.—It is stated the Government has lately placed two very large orders for nuts and bolts for delivery over the remainder of this year, and these are to be allocated to the makers within a short time. Practically 90 per cent or more of the present output of nuts and bolts is going to the Government on direct or indirect orders, but a limited part of the output is available for commercial uses. Discounts on nuts and bolts as given on page 1701 have been reaffirmed by the War Industries Board for the quarter ending Sept. 30.

Rivets.—Efforts of makers to secure an advance of rivets were without avail, as present prices have been reaffirmed for the quarter ending Sept. 30. The shortage in supply of steel is cutting down the rivets to about 75 per cent of normal and practically this entire output is going to the Government on direct and indirect orders. The demand for ship rivets is enormously heavy and output is sold up for months. We quote cone-head structural rivets at $4.40 and cone-head boiler rivets at $4.50 per 100 lb., and small rivets 50 and 10 per cent off list, f.o.b. Pittsburgh, for quarter ending Sept. 30.

Skelp.—On this product makers are sold up for practically the remainder of the year and prices given below have been reaffirmed to Sept. 30.

We quote grooved skelp at $2.90; universal skelp, $3.15, and sheared skelp, $3.25 base. Special skelp for boiler tubes, etc., is $3.40 for base sizes and $3.55 for other sizes, all prices being per 100 lb., f.o.b. Pittsburgh.

Wrought Pipe.—Mills and jobbers continue to give 100 per cent service to the movement in the supply of pipe for war essentials. Leading pipe mills report their output under contract for the remainder of this year, and several of the larger mills are sold up into first quarter of 1919. Large orders for iron and steel pipe are being placed for new work in connection with shipyards and powder plants. Stocks of jobbers are low, but are being replenished by the mills when it is shown the material is going out to customers working on war materials. Discounts on iron and steel pipe as reaffirmed to Sept. 30 are given on page 1701.

Spikes.—Only very small orders are being placed for railroad spikes, but the demand for boat and small spikes is extremely heavy, and makers are sold up for three or four months. Prices as reaffirmed to Sept. 30 are as follows:

Standard sizes of railroad spikes 9/16 x 4½ in. and larger, $3.90 per 100 lb. in lots of 200 kegs of 200 lb. each, or in larger lots. Boat spikes, $5.25 per 100 lb., track bolts, $4.90 base in lots of 200 kegs or more; less than 200 keg lots, $1 per 100 lb. extra. All f.o.b. Pittsburgh.

Boiler Tubes.—Makers of iron and steel tubes and also of seamless steel tubing are sold up for six months to a year with Government orders still coming in at a heavy rate. The Government is anxious for maximum oil production, and this is creating a very heavy demand for oil country goods. Discounts on iron and steel tubes, effective to Sept. 30, are given on page 1701.

Coke.—Effective from June 25, the freight rate on coke from the Connellsville regions to the Valley districts will be $1.45 per net ton, as against $1.15, the present rate. The supply of cars is still very satisfactory and furnaces are getting coke about as fast as needed, while some have been able to accumulate some stock coke. Recently some fairly large contracts for 72-hr. foundry coke have been made for delivery over the last half of the year at the regular Government price at $7 per net ton at oven. One producer has a large contract for furnace coke on its books at $9 per net ton at oven that does not expire until the end of this year. The Connellsville *Courier* gives the output of coke in the Upper and Lower Connellsville regions for the week ending June 15 as 342,970 tons, an increase over the previous week of 1950 tons. Prices on coke have been reaffirmed to Sept. 30 as follows: 48-hr. foundry coke, $6; 72-hr. foundry coke, $7; and crushed coke from 1-in. size, $7.35, all in net tons at oven.

Old Material.—Dealers report that the available supply of scrap seems to be getting smaller, making it more difficult for them to find material for their customers. All consumers are eager to buy scrap, but can get it only in very limited quantities. Some small sales of heavy steel scrap, borings and turnings and low phosphorus melting scrap are being made at regular prices, dealers being paid the 3½ per cent commission for obtaining the material. Prices on iron and steel scrap in effect until Sept. 30, nearly all of which were fixed by the Government, for delivery in Pittsburgh and other consuming points that take Pittsburgh freights are as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Monessen, Midland and Pittsburgh, delivered	$29.00
No. 1 cast scrap (for steel plants)	29.00
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., Franklin, Pa., and Pittsburgh	34.00
Hydraulic compressed steel scrap	29.00
Bundled sheet scrap, sides and ends, f.o.b. consumer's mills, Pittsburgh district	$24.00 to 25.00
Bundled sheet stamping scrap	22.00 to 23.00
No. 1 railroad malleable scrap	28.00 to 29.00
Railroad grate bars	18.00 to 19.00
Low phosphorus melting stock (unguaranteed)	34.00
Low phosphorus melting stock (guaranteed)	36.50
Low phosphorus melting stock (bloom and billet ends, heavy plates)	29.00
Iron car axles	46.00 to 46.50
Locomotive axles, steel	46.00 to 46.50
Steel car axles	46.00 to 46.50
No. 1 busheling scrap	28.00 to 29.00
Machine shop turnings	18.00 to 19.00
Cast iron wheels	28.00 to 29.00
Rolled steel wheels	34.00 to 36.00
Sheet bar crop ends (at origin)	34.00 to 35.00
Cast iron borings	18.50 to 19.00
No. 1 railroad wrought scrap	33.00 to 34.00
Heavy steel axle turnings	23.00 to 24.00
Heavy breakable cast scrap	28.00 to 29.00

Chicago

CHICAGO, June 24—(*By Wire*).

The prices of steel products will be left unchanged through the third quarter of the year. Likewise, Chicago as a basing point has been eliminated, a move favorably regarded by local mills, as it is equivalent to an advance in price. Selling on the Pittsburgh base, they will add the freight to Chicago to make the local price, thereby adding $5.40 per ton to their profit on local delivery. On the basis of a 25 per cent advance, the freight rate Pittsburgh to Chicago is 27c. per 100 lb. or $5.40 per net ton. Eastern mills which have shipped West for Government work and which have been asked to sell at the Pittsburgh-Chicago price under the dual basing system will benefit under the single base system, inasmuch as they can add the freight of the Western consumer to pay, whether the latter be Government or contractor. Western mills selling in the East must assume the freight to Pittsburgh if the arrangement works as of old. Under the advance of 45c. on Lake Superior ore, independent pig iron producers will find their costs about 90c. per ton higher, to say nothing of increased cost because of higher freight rates on coke, limestone and other supplies. In connection with the freight rate and ore price readjustments, there is much dust yet to settle.

The 800,000 wheels required for the Government freight cars have been placed. The Griffin Wheel Co. was awarded 126,000 cast-iron wheels, the American Car & Foundry Co. 248,000, the Pressed Steel Car Co. 56,000, the Haskell & Barker Car Co. 64,000, the Mt. Vernon Car Mfg. Co., 32,000 and the National Car Wheel Co. 20,000. The number of steel wheels placed, 200,000, is less than was at first contemplated. An inquiry for 6000 cars for the French state railways has been received.

Pig Iron.—The activities of furnace representatives are largely confined to shipping against old contracts and, as the Government directs, to those who may need iron for war purposes not covered by contract. They also are engaged in notifying certain inquirers they cannot be supplied until they have obtained Government consent. It is understood that the War Industries Board will not issue priority certificates covering pig iron, but will expect the producers to be guided by the questionnaires recently answered by consumers, and care for the melters who directly or indirectly are serving the preferred industries. For these it is believed there will be plenty of iron. As a rule, a majority of foundries find that 75 to 80 per cent of their contracts for castings are for the so-called essential industries. It is pointed out that where this situation exists there is but little need for foundries to hoard iron. Many foundries are actively engaged in seeking work which comes in the favored classes, some for the reason they may have to shut down if they do not get it; others because they need more to make profitable that which they have. Malleable is in especially good demand, but extremely scarce. Other grades are in demand also, some being wanted for 1919, but these inquiries are receiving scant attention. Now that the third quarter prices have been fixed, several of the furnaces, especially those located in the South, are expected to authorize some selling for the last half. The new freight rates, effective to-morrow, make the rate from Birmingham to Chicago $5.

The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic irons, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5	$38.00
Lake Superior charcoal, No. 6 and Scotch	$39.50 to 41.00
Northern coke foundry, No. 1	33.50
Northern coke foundry, No. 2	33.00
Northern coke foundry, No. 3	32.50
Northern high-phosphorus foundry	33.00
Southern coke, No. 1 foundry and No. 1 soft	39.00
Southern coke, No. 2 foundry	38.00
Malleable	33.50
Basic	32.00
Low phosphorus (copper free)	53.00
Silvery, 7 per cent	46.20

Ferroalloys.—A good demand has been created for spiegeleisen owing to the greater extent to which it is being used by foundries. The quotation for 16 to 18 per cent is $75, furnace. Ferromanganese is in light demand, 70 per cent being quoted at $250, delivered. Fifty per cent ferrosilicon is quoted at $155 to $165, delivered.

Plates.—The mills are completely absorbed in Government requirements and not much more can be said. Added to ship plates, are those required for Government cars. Of the materials required for the Government's 100,000 freight cars, the leading interest will furnish about 292,000 tons, this including plates, shapes and bars. The mill quotation for plates is 3.25c. Pittsburgh. Jobbers quote 4.45c., but can deliver to preferred industries only

Bars.—The situation in mild steel bars is comparable with that in plates and shapes, but iron bars are easily obtainable. Mills rolling the latter have felt an improvement in business, but expect a still greater betterment in view of the scarcity of steel and the fact that basing the steel price on Pittsburgh will serve to bring iron and steel closer together in price at Chicago. The scarcity of rerolling rails continues to restrict the production of rail carbon bars. We quote mild steel bars at 2.90 , Pittsburgh, subject to freight to Chicago of 27c. per 100 lb. Iron bars are quoted at 3.50c., Pittsburgh, and rail carbon bars at 3c., Pittsburgh. Jobbers' prices will be advanced to accord with the new freight rates.

Structural Material.—The city of Chicago is asking for bids on 8700 tons for the Rush Street bridge, a part of the Michigan Boulevard improvement, but the general opinion seems to be that the Government will not permit that much steel to be so utilized. The Kansas City Structural Steel Co. will fabricate 255 tons required for a power house for the Northwestern Electric Co., Portland, Ore., and the California Steel Co. will supply 500 tons to the California Hawaiian Sugar Co. for an extension to a charhouse at Crockett, Cal. The official mill quotation is 3c., Pittsburgh, to which must be added freight to Chicago 27c. per 100 lb. Jobbers have been quoting 4.25c. for material out of stock, but this price will also be affected by the change in freight.

Sheets.—With leading local independent interest operating at about 75 per cent of capacity and doing no selling except where Government requirements are to be filled, there can hardly be called a market. We quote No. 28 black at 5c.; No. 28 galvanized at 6.25c. and No. 10 blue annealed at 4.25c., all Pittsburgh.

Wire Products.—The American Steel & Wire Co. is now considering business as it comes under the preferred industry list. It will serve those entitled to preference first, then others so far as its supply of steel will permit. Producers of food will receive special attention.

Bolts and Nuts.—The makers are receiving an avalanche of orders, but where these are not covered by priority certificates, the would-be buyers are being informed of the necessity of this formality. The holders of old contracts are receiving similar information. Ninety per cent of these are for essentials. For prices and freight rates, see finished iron and steel, f.o.b. Pittsburgh, page 1701. Jobbers quote:

Structural rivets, 5.50c.; boiler rivets, 5.60c.; machine bolts up to ⅞ x 4 in., 40 and 10 per cent off; larger sizes, 35 and 5 off; carriage bolts up to ⅞ x 6 in., 40 and 2½ off; larger sizes, 30 and 5 off; hot pressed nuts, square tapped, $1.05 off, and hexagon tapped, 85c. off per 100 lb.; coach or lag screws, gimlet points, square heads, 50 per cent off.

Cast-Iron Pipe.—Cleveland will let 600 tons June 27 and Newcastle, Wy., 200 tons June 28. Quotations per net ton, Chicago, under the new freight rates are as follows: Water pipe, 4 in., $65.05; 6 in. and larger, $62.05.

Rails and Tracks Supplies.—There is no active market. We quote:

Standard railroad spikes, 4.11½c., Chicago. Track bolts, with square nuts, 5.11½c., Chicago. Tie plates, steel, 3.25c.; tie plates, iron, 3.75c.; f.o.b. maker's mill. The base for light rails is 3c., f.o.b. maker's mill for 25 to 45-lb. sections, lighter sections taking Government extras.

Old Material.—The market is active and prices show a decided tendency to stiffen. Malleable scrap is in

good demand and scarce, while cast is picking up. There is a likelihood that melting steel may be shipped to the East. In view of the approach of higher freight rates, shipments have been heavy, but already they show signs of tapering off. Several railroads have issued small or medium-sized lists, the Rock Island offering 500 tons of re-rolling rails.

We quote for delivery in buyers' yards, Chicago and vicinity, all freight and transfer charges paid, as follows:

	Per Gross Ton
Old iron rails	$38.00 to $39.00
Relaying rails	55.00 to 60.00
Old carwheels	29.00
Old steel rails, rerolling	34.00
Old steel rails, less than 3 ft	34.00
Heavy melting steel	29.00
Frogs, switches and guards, cut apart	29.00
Shoveling steel	29.00
Steel axle turnings	24.00
	Per Net Ton
Iron angles and splice bars	$34.82
Iron arch bars and transoms	41.50
Steel angle bars	$29.00 to 30.00
Iron car axles	41.52
Steel car axles	41.52
No. 1 railroad wrought	29.75 to 30.36
No. 2 railroad wrought	27.75 to 28.25
Cut forge	27.75 to 28.25
Pipes and flues	23.50 to 24.00
No. 1 busheling	26.00 to 26.50
No. 2 busheling	17.50 to 18.00
Steel knuckles and couplers	30.36
Coil springs	30.36
No. 1 cast scrap	27.50 to 28.00
Boiler punchings	32.00 to 33.00
Locomotive tires, smooth	39.00 to 40.00
Machine-shop turnings	15.75 to 16.25
Cast borings	16.25 to 16.75
Stove plate and light cast scrap	23.00 to 23.50
Grate bars	23.00 to 23.50
Brake shoes	24.00 to 24.50
Railroad malleable	29.50 to 30.00
Agricultural malleable	28.00 to 29.00
Country mixed scrap	20.00 to 20.50

Birmingham

BIRMINGHAM, ALA., June 24.

Pig Iron.—Many bookings have been forwarded to Washington for approval, but replies are not quickly forthcoming. Meanwhile makers are using best judgment on priority in movements of regular orders and non-essential consumers are beginning to feel the pinch. Low-grade output, which is not generally covered by orders already booked, but which furnace companies dispose of as made, bids fair to accumulate unless Washington becomes quicker in dealings with operators. Makers are much concerned over the new freight rates on assemblage of raw materials. Under the Railroad Administration order they would fall in the commodity instead of class column and, with the addition of 25 per cent, would lead to increases of 100 to 300 per cent. Adding the higher rate on finished material to the North, West and East, Southern makers foresee a curtailment of trade territory looming up after the rush is over and the establishment of a precedent that will seriously affect trade in normal times due to difficulty in re-establishing present rates. The Sloss-Sheffield, Gulf States, Trussville and other companies have entered a protest. Gradually labor and all other costs in the South have approached the Northern standard and added cost of assembling raw materials in a degree greater than in other territory will have far-reaching effects. Mr. McAdoo will be made familiar with the situation and asked to leave the intrastate assembling rates in their present class with the addition of the general rate of increase. Furnace operations have not perceptibly improved and pig iron production bids fair to remain for some time on a basis of something like 30,000 tons per month under last year. The Sheffield Iron Corporation has agreed to Government fixing of ore mine wages in the Russellville district. Beginning of operations at the Sheffield iron plant is not yet scheduled by date. The situation with the Talladega furnace is the same. We quote per gross ton f.o.b., Birmingham district furnaces, as follows: No. 2 foundry and soft, $33; basic, $32.

Cast-Iron Pipe.—Pipe shops will be affected by priority orders adversely to an extent, but the bulk of business being for cantonments, the production will not be largely decreased. New Orleans is making experiments, thus far successful, on use of cast-iron pipe for gas mains from natural gas wells 60 miles distant. This foreshadows orders for considerable Birmingham district pipe of 12 and 16 in. diameter.

Coal and Coke.—There is some semblance of greater disposition to work full time in the mining fields since returned soldiers have been pleading at mine camps. Investments in war savings stamps and Liberty Loan bonds have also stimulated through this additional call on the pocketbook. It has been recognized that to make the miner work more hours under present high wages, he must realize a greater spending capacity. Production is still under that of last year.

Old Material.—Shiftings in quotations rarely exceed $1 one way or the other, remaining practically at a standstill with the bulk of material going into Southern consumers' yards. We quote per gross ton f.o.b., Birmingham district yards, prices to consumers, as follows:

Old steel axles	$34.00 to $35.00
Old steel rails	28.00 to 28.50
Heavy melting steel	25.00 to 26.00
No. 1 railroad wrought	30.00 to 32.00
No. 1 cast	27.00 to 28.00
Old carwheels	29.00 to 29.50
Tramcar wheels	26.00 to 26.50
Machine shop turnings	15.00 to 16.00
Cast iron borings	15.00 to 16.00
Stove plate	23.00 to 23.50

St. Louis

ST. LOUIS, June 24.

Pig Iron.—New transactions are confined to the small quantities available from furnaces after Government or existing contract requirements are taken care of and are mostly of about 100 tons and for spot or early shipment. There is some diversion of shipments reported from the more fortunate purchasers to unfortunate brethren, but these transactions are few and furnace representatives have nothing to do with them, owing to the restrictions of the Government orders regarding resale of iron. The sharp demand from consumers continues, but they are awaiting the developments of the day in the hope that something will come their way; with needs of 100,000 tons or more there is little real expectation of relief. Deliveries to consumers entitled to metal are more satisfactory and this is helping the general output situation of the industries.

Coke.—For the most part contracts expiring this month have been renewed on the basis of the quantities and deliveries of the previous year, but the ovens are holding close to the condition that failure or inability to ship the quota of any one month automatically cancels that portion of the quota because of the sold up conditions existing. The by-product plants are in the same general situation as to metallurgical coke and heavy contracting for domestic coke during recent weeks has also put a period to any new business in that line for some time to come.

Finished Iron and Steel.—In finished products there is a deadly sameness in the reports from week to week from mill representatives and warehousemen alike. Movement out of warehouse continues as heavy as supplies will permit. For stock out of warehouse we quote as follows: Soft steel bars, 4.17c.; iron bars, 4.17c.; structural material, 4.27c.; tank plates, 4.52c.; No. 8 sheets, 5.47c.; No. 10 blue annealed sheets, 5.52c.; No. 28 black sheets cold rolled one pass, 6.52c.; No. 28 galvanized sheets, black sheet gage, 7.77c.

Old Material.—In scrap the demand has increased sharply with a hardening tendency on prices and local industries are evidencing a willingness to take in all that is suited to their needs. Little old material is being uncovered. Light cast iron and stove plate has been put somewhat out of line by sharp demand from the Chicago territory which has offered as high as $24 delivered Chicago with the result that prices have been sent sharply upward. Carwheels are entirely unobtainable in this market and quotations therefore are entirely nominal. Recent statements by the regional railroad director as to relaying rails have strengthened them in the market and the range of prices, though somewhat wide, is more generally toward the top figure. Heavy melting steel is selling on the commission basis and is difficult to get. The railroads are offering little

publicly, but a number of sales have been made without sending out inquiry lists during the recent past. The Frisco thus disposed of about 1000 tons the past week and other lines smaller amounts. Dealers generally are looking for still higher prices and a decidedly accentuated shortage of material. We quote dealers' prices, f.o.b. customers' works, St. Louis industrial district, as follows:

	Per Gross Ton	
Old iron rails	$37.00 to	$37.50
Old steel rails, rerolling	33.50 to	34.00
Old steel rails, less than 3 ft.	31.00 to	31.50
Relaying rails, standard sections, subject to inspection	55.00 to	65.00
Old carwheels	28.50 to	29.00
No. 1 railroad heavy melting steel scrap	28.50 to	29.00
Heavy shoveling steel	27.00 to	27.50
Ordinary shoveling steel	26.50 to	27.00
Frogs, switches and guards, cut apart	28.50 to	29.00
Ordinary bundled sheet scrap	23.00 to	23.50
Heavy axle and tire turnings	20.50 to	21.00
Per Net Ton		
Iron angle bars	$33.00 to	$33.50
Steel angle bars	27.00 to	27.50
Iron car axles	40.00 to	40.50
Steel car axles	40.00 to	40.50
Wrought arch bars and transoms	40.00 to	40.50
No. 1 railroad wrought	28.50 to	29.00
No. 2 railroad wrought	27.50 to	28.00
Railroad springs	29.50 to	30.00
Steel couplers and knuckles	29.50 to	30.00
Locomotive tires, 42 in. and over smooth inside	37.00 to	37.50
No. 1 dealers' forge	26.00 to	26.50
Cast iron borings	16.00 to	16.50
No. 1 busheling	25.00 to	25.50
No. 1 boilers, cut to sheets and rongs	22.50 to	23.00
No. 1 railroad cast scrap	25.50 to	26.00
Stove plate and light cast scrap	21.50 to	22.00
Railroad malleable	26.00 to	26.50
Agricultural malleable	25.00 to	25.50
Pipes and flues	23.00 to	23.50
Heavy railroad sheet and tank scrap	22.50 to	23.00
Railroad grate bars	20.00 to	20.50
Machine shop turnings	16.00 to	16.50
Country mixed scrap	19.50 to	20.00
Uncut railroad mixed scrap	23.50 to	24.00

Buffalo

BUFFALO, June 24.

Pig Iron.—There is no surplus of iron available for any purpose aside from Government work, which is absorbing practically the full tonnage of output. Foundries engaged on other than essential work for Government uses and having only small reserve stocks of pig iron are finding it more and more difficult to keep in operation and are obliged to eke out their supply of pig iron with larger proportions of scrap materials and may be gradually forced out of business, or into work in essential lines. Other melters have fairly good reserves and will be able to continue on non-essential lines for some time longer. Shipments on Government requirements have been exceptionally heavy, and iron is being distributed to consumers in conformity to the new regulations so far as promulgated. Under present conditions, no new business is being considered, sellers waiting to ascertain if there is to be a possible upward revision of prices by the Government to offset additional cost of production on account of the advance in price of ore and the increase in freight rates. We continue the current schedule, f.o.b. furnace, Buffalo, as follows:

No. 1 foundry, 2.75 to 3.25 silicon	$34.50
No. 2 X, 2.25 to 2.75 silicon	33.50
No. 3 foundry, 1.75 to 2.25 silicon	32.50
Gray forge	32.00
Malleable	33.50
Basic	32.00
Lake Superior charcoal, regular grades, f.o.b. Buffalo	37.50

Finished Iron and Steel.—There is a steady and even brisk demand for practically all lines of finished and semi-finished products for Government uses, including plates, shapes, bars, electric furnace steel and alloy steel and orders are being placed by the Government right along in 50, 100 and 200 ton lots. One order is noted for a good sized tonnage of plates to be forwarded to Canada for use in ship construction. It is stated a movement is now pending to secure the consent of the Government for the replacement of tonnages of finished materials which have been furnished by jobbers from their stocks for use for war essential purposes. Mills and selling agencies are distributing to their customers the classification card furnished by the war board by which shippers are to be governed hereafter in the furnishing of materials in the order of importance, and stating that nothing which does not conform to this classification, or which is not covered by the preference list issued by the director of steel supply, can be shipped out. The Government has an inquiry before the market here for good sized tonnages of reinforcing bars for three warehouse construction jobs.

Old Material.—Demand is strong for all classes of scrap, heavy melting steel leading in this particular, with inquiry from Youngstown and Pittsburgh districts especially urgent, showing that steel mills are in very pressing need of this commodity. From present indications, there are to be no changes in scrap prices, the sub-committee at its Philadelphia meeting last week having recommended that no change in base prices be made; except, as it is understood here, to set the price of re-laying rails at $60 to $65. This regulation is noted with satisfaction by the local trade, as the price which had been asked for relaying rails for some time past was higher than the price of new rails, and this action stabilizes the price for this commodity. Some very large orders for cast scrap are expected to materialize as a result of the price schedule being left unchanged owing to the fact that several large users of cast scrap were waiting to see what the committee would do before they went into the market for this class of scrap. We continue the existing schedule, per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel		$29.00
No. 1 low phosphorus, heavy, 0.04 and under		39.00
Low phosphorus, 0.04 and under		36.50
Low phosphorus, not guaranteed		34.00
No. 1 railroad wrought		34.00
No. 1 railroad and machinery cast		34.00
Iron axles	$44.00 to	46.00
Steel axles	44.00 to	46.00
Carwheels		29.00
Railroad malleable		34.00
Machine shop turnings	17.00 to	17.50
Heavy axle turnings		24.00
Clean cast borings	18.00 to	19.00
Iron rails	36.00 to	37.00
Locomotive grate bars	24.50 to	25.00
Stove plate	24.50 to	25.00
Wrought pipe	27.00 to	28.00
No. 1 busheling scrap	29.00 to	30.00
No. 2 busheling scrap	21.00 to	23.00
Bundled sheet stamping scrap	21.00 to	23.00

Philadelphia

PHILADELPHIA, June 25.

The announcement that iron and steel prices, except for iron ore, would be unchanged for third quarter caused no surprise. Pig iron sellers expressed disappointment that no advance on that product was authorized. The decision to eliminate Chicago as a basing point on steel is noted with satisfaction by Eastern mills, which have orders on their books for shipments of plates and shapes to Western shipyards and other consumers. The War Industries Board contemplates the restriction of the output of sheet mills to 75 per cent of capacity, and the steel thus released will be used as sheet bars for rolling mills that do not make their own steel, or the steel will be used in other products, as the War Industries Board may direct. The Sub-Committee on Scrap Iron and Steel of the American Iron and Steel Institute is working with the War Industries Board in allocating supplies of scrap to essential plants which are not able to procure sufficient material in the markets. The railroads and ordnance plants are being depended upon at present for the scrap thus allocated.

Pig Iron.—Makers of foundry iron are looking for some announcement from the War Industries Board concerning preferences in the shipment of iron. Just what form this may take has not been made known, but there has been a suggestion of a zone system as in the case of coal and coke shipments. Certain industries may be eliminated almost entirely from consideration for the

present, or until the quantity of foundry iron that will be available is fully determined. Furnaces continue to make shipments, using the information on the questionnaires recently submitted to iron consumers as a guide in determining how much iron, if any, each consumer should get. A consumer having only 50 per cent direct or indirect Government business is allowed 50 per cent of iron contracted for. This plan will be followed until more definite instructions come from the War Industries Board. In the pig iron trade there has been disappointment that prices were reaffirmed for third quarter. Some of the smaller producers are still hopeful of a readjustment by the general committee that will make up for the increased costs due to higher freight rates. New contracts are being made subject to a clause which reads in most cases about as follows: "This contract is taken subject to any rules, regulations or instructions which have been made or may be made by the United States Government or its authorized representatives affecting prices, deliveries or any other conditions." The low phosphorus iron situation is being carefully studied by Leonard Peckitt, who is the sub-committee in charge of this grade of iron, and it is stated that the makers will be able to supply all consumers who need iron for war work. Others will undoubtedly be obliged to go without. Orders for about 15,000 tons of low-phosphorus iron are being allotted this week among several makers. Two Bethlehem Steel Co. furnaces at Lebanon, Pa., are ready to be blown in, but have not yet received a sufficient supply of coke. No. 2 X foundry iron, delivered from nearby furnaces to Philadelphia consumers, will now approximate $34.40, instead of $34 25, due to the 25 per cent advance in freight rates on June 25. Virginia iron delivered in Philadelphia will be $37.60 for No. 2 X foundry and $37.10 for No. 2 foundry. We quote standard grades of iron f.o.b. furnace, except Virginia iron, for which delivered prices are quoted:

Eastern Pennsylvania No. 1 X	$34.50
Eastern Pennsylvania No. 2 X	33.50
Eastern Pennsylvania No. 2 foundry	33.00
Virginia No. 2 X (including freight)	37.60
Virginia No. 2 foundry (including freight)	37.10
Basic	32 00
Gray forge	32.00
Bessemer	35.20
Standard low phosphorus	53.00
Low phosphorus (copper bearing)	50.00

Ferroalloys.—The market for ferromanganese and spiegeleisen is quiet. Ferromanganese continued to be quoted at $250, f.o.b. furnace, with freight allowed, and spiegeleisen is firm at $75, f ob. furnace.

Semi-Finished Steel.—There are no developments in semi-finished steel. The new freight rate makes the price of 4 x 4 in. open-hearth rerolling billets $51.30 f.o.b. Philadelphia.

Finished Iron and Steel.—The War Industries Board will restrict the production of sheets to 75 per cent of normal capacity. It is reported that the smaller mills will be supplied with sheet bars, as far as possible, so that all manufacturers may operate on the same basis. The principal object of the restriction is to conserve steel for other products more urgently needed than sheets. Steel companies report that jobbers are now being freely supplied with steel, the position of the jobbers with respect to stocks being much better than two or three months ago. One company requires its jobber customers to furnish at the end of each month a list of its sales of steel for essential work, and this quantity is replaced. This method seems to have the sanction of the Director of Steel Supply, but apparently no secret is made of the fact that any jobber who violates the agreement to sell all steel for war work will lose his supply entirely. Mills continue to receive liberal specifications for plates and shapes for shipbuilding. The locomotive companies have also sent in additional specifications in the past week. It is reported, but not confirmed, that the United States Signal Corps is obtaining bids on 1000 hangars for aircraft. We quote plain material at 3c.; plates at 3.25c.; soft steel bars at 2.90c.; No. 10 blue annealed sheets at 4.25c.; No. 28 black sheets at 5c., and No. 28 galvanized sheets at 6.25c., all Pittsburgh. The new freight rate makes the delivered price of bar iron 3.73c.

Old Material.—In co-operation with the Director of Steel Supply the Sub-Committee on Scrap Iron and Steel of the American Iron and Steel Institute, of which W. Vernon Phillips, Philadelphia, is chairman, is allocating scrap to steel plants and other consumers whose requirements are known to be for war work and who cannot obtain sufficient supplies in the markets. The railroad companies and ordnance plants are furnishing most of the scrap thus far used for this purpose, and so far it has not been necessary to take any material from scrap yards or en route. In allocating old material the sub-committee will interfere as little as possible with regular business. Reports continue to come to the sub-committee from consumers showing their supplies of scrap on hand as compared with a year ago. From a casual survey of these reports the committee finds that all consumers have a very much smaller supply on hand than is customary at this time of year. No. 1 forge fire, turnings and borings for blast furnaces, grate bars and stove plates are higher. We quote for delivery at buyer's works, eastern Pennsylvania, as follows:

No. 1 heavy melting steel	$29.00
Steel rails, rerolling	34.00
No. 1 low phosphorus heavy 0.04 and under	39 00
Low phosphorus, 0.04 and under	36.50
Low phosphorus (not guaranteed)	$33.00 to 34.00
Old iron rails	39 00
Old carwheels	29.00
No. 1 railroad wrought	34.00
No. 1 yard wrought	33.00
Country yard wrought	29.00
No. 1 forge fire	28.00 to 29.00
Bundled skeleton	26.00 to 27 00
No. 1 busheling	31.00
No. 2 busheling	17.00 to 18.00
Turnings (for blast furnace use)	18.00 to 19.00
Machine shop turnings (for rolling mill use)	18.50 to 19.00
Cast borings (for blast furnace use)	18.00 to 19.00
Cast borings (clean)	19.00
No. 1 cast (for steel plant use)	29.00
No. 1 cast (cupola sizes)	33.00 to 34.00
Grate bars	25.00
Stove plate	25.00 to 26.00
Railroad malleable (for steel plants)	28.00 to 29.00
Railroad malleable (for malleable works)	31.00 to 32.00
Wrought iron and soft steel pipes and tubes (new specifications)	33.00
Ungraded pipe	29.00

British Steel Market

Pig Iron and Ferroalloys Are Unchanged—Tin Plate Is Firmer—Hematite Demand Heavy

(By Cable)

LONDON, ENGLAND, June 26.

Pig-iron fundamentals are unchanged. Deliveries of Cleveland foundry iron are adequate. The demand for hematite is heavy. American semi-finished material is unobtainable. The tin plate market is active and firmer at 32s. 3d. basis. Quotations on ferroalloys are unchanged and the market is firm. We quote as follows:

Tin plate coke, 14 x 20; 112 sheets, 108 lb., f.o.b. Wales, 32s. 3d.
Ferromanganese, $255, c.i.f. for export to America; £26 10s. for British consumption.
Ferrosilicon, 50 per cent, c.i.f., £35 upward.
On other products control prices per gross ton are:
Hematite pig iron, East Coast, £6 2s. 6d.; West Coast, £6 7s. 6d.
Cleveland pig iron, £4 15s. for No. 3 and £6 for basic.
Steel plates, ship, bridge and tank, £11 10s.
Steel sheets, black plate, all open annealed, produced in sheet mills, £16 to £18.
Bar iron, standard quality, £13 17s. 6d.; marked, £16.
Sheet and tin plate bars, £10 7s. 6d.
Blooms and billets for rerolling (ordinary), £10 7s. 6d.; special quality, £11.

(By Mail)

Pig Iron Exports More Active and Easier—Tin Plates and Tin Lower

LONDON, ENGLAND, June 4.—General conditions remain stringent, and there is no indication of supplies overtaking demand. The movement of raw material, while rather more satisfactory, is still very irregular, in spite of improved transportation. Productive capacity is being utilized to the fullest extent, and prac-

tically all trade is under control, merchant business being almost non-existent while export permits are confined to national needs.

The position of iron masters remains tight, foundry grades being urgently needed against overdue contracts. Trade in the Cleveland district is brisk, owing to the large allocations made for this month, although deliveries in May were heavy, due to the better supply of trucks and resort to water transport. Forge iron is active and strong, with a heavy Scotch demand. Pig-iron export business is more active, increased tonnage being available which has permitted arrears in hematite on Italian account to be worked off to a considerable extent. This, with the continuous large home demand, has put additional pressure on the furnaces, which find no little difficulty in meeting the demands, although makers are pretty comfortably situated as to raw materials.

Practically the whole of the home output of semi-finished steel is requisitioned for Government work. Conditions disclose no new feature, although it is understood that arrangements are being made in Staffordshire for the production of wire rods in order to remedy the absence of American supplies. There is no sign of a renewal of offers through merchants or agents.

In finished steel the congestion of orders is as formidable as ever, and the strain on mills continues unabated. Additional business is coming forward in excess of capacity. There is a brisk demand for bar iron, especially five-eights and half-inch sizes for nut and bolt makers. Controlled prices remain as before, unmarked bars standing at £13 7s. 6d. net, f.o.t. at makers' works, which is more than double the price current prior to the war. Costs have of course risen tremendously. The steel sections are flooded with work and calls for shipbuilding material are heavy. The sheet output is about two-thirds of capacity, and is chiefly absorbed by military needs.

The tin-plate market has obviously been affected by the further considerable fall in the price of tin, owing to which the basis price of cokes, 20 x 14, has dropped to 32s. 9d. net. The negotiation of business has been restricted and, in view of the changed aspect of the improved situation in tin, prices have been cut by makers to about 32s. basis. Export business rules quiet, French needs being covered by the big orders outstanding. There is a fair inquiry for Portugal and the home demand, chiefly for Government requirements, has increased. The demand for oil plates hangs fire after the orders booked recently, but it is expected that large orders will appear later on for the Eastern traders for next quarter.

Ferromanganese continues firm, but business is restricted. Licenses for Continental ports are hard to get, but there is a fair demand, the nearest quotation being £60 f.o.b. for loose in all positions. Only few inquiries are coming forward from America and Canada, c.i.f. quotations for Atlantic ports ranging from $260 to $265, at which business has been done lately.

New York

NEW YORK, June 25.

Pig Iron.—The one topic of discussion is the action of the Government in reaffirming prices of pig iron while advancing the price of Lake Superior iron ore 45c. per ton. Representatives of some of the smaller furnaces in Tennessee, Virginia and western and central Pennsylvania state that it will be impossible for their furnaces to operate when they come to use ore purchased at the higher prices, and there is already talk of blowing out in the case of some operators, but well-informed observers express the opinion that the Government will not allow any furnaces to blow out. All the iron that can possibly be made will be needed, and it is very probable that if certain furnaces can show that they will be compelled to operate at a loss, they will be given relief. At the present time a large part of the energy of the Government is being directed toward increasing the production of low-phosphorus pig iron and whenever ore suitable for use in making this iron can be located, Government officials are serving notice on furnace operators that they will be expected to allow makers of low-phosphorus pig iron to use the ore if they cannot themselves make this grade of iron. There are practically no new sales. Foundries with orders on producers' books are in some cases not as sure of getting their iron as others which have taken Government business, but without providing for their pig iron. Some time ago, Government contractors who undertook to furnish machinery or munitions for war purposes without being covered on raw materials were not always sure of Government help in getting the latter. Now such firms have assurance on this point. The new coke and pig-iron freights are of interest. On Virginia iron the freight into New England by all-rail has been $3.77; it is now $4.70. From the Lehigh Valley to tidewater the advance is from 74c. to 90c. The Buffalo rate into New England, formerly $3.10, is now $3.90. On coke the new rate to Newark from the Latrobe field is $2.90, formerly $2.25. From Connellsville the new figure is $3.10, formerly $2.45. To New York and Brooklyn the Connellsville rate has advanced from $3 to $3.80, and to Connecticut points from $3.65 to $4.40. The rate from the Latrobe district is 20c. less in each case. We quote prices as follows for tidewater delivery on the basis of the new freight rates for Northern grades, rates on Southern grades not having been announced:

No. 1 X	$35.40
No. 2 X	34.40
No. 2 plain	33.90
No. 2 X Virginia	37.90

Ferroalloys.—Following the recent buying of ferromanganese in the Middle West the market has been notably inactive. Some metal has been received under the issue of British licenses for a total of 12,000 tons and some is afloat, but there is no indication as to licenses beyond the amount stated. The arrangement by which 35,000 tons a month of Brazilian manganese ore will be brought in, the cargoes on the southbound trip being coal for Brazilian railroads, guarantees a fairly easy situation for the next six months, and in that time the production of domestic ores is likely to increase. We continue the quotation of $250, delivered, for 70 per cent ferromanganese and $4 per unit above that limit. Spiegeleisen is quoted as heretofore at $75, furnace, for 16 per cent, plus $3.50 for each additional unit. On 50 per cent ferrosilicon the quotation of $150 per ton, delivered, is continued on contract orders, and $160 to $165 for spot and prompt. Quotations on other ferroalloys appear in this column in the first issue of each month.

Finished Iron and Steel.—The largest new structural development of the week is a 2800-ton bridge over the Delaware for the Central Railroad of New Jersey. It is understood that the project at San Antonio for the Quartermaster Department, comprising two buildings and involving 1500 to 1600 tons, has been revived. It is learned that 2000 tons more work at Camp Perry has been awarded, this being for a warehouse to be built by the McClintic-Marshall Co. The American Bridge Co. has taken 800 tons at Aberdeen, Md., for the Quartermaster Department and 200 tons for repairs for the Pennsylvania Railroad and 200 tons for a swing bridge for the same road. It is expected that when the next naval appropriation bill is passed considerable structural work will come on the market. With the new freight rate of 24.5c. per 100 lb., which went into effect on June 25, we quote: Steel bars, 3.145c.; shapes, 3.245c.; plates, 3.495c., and bar iron, 3.745c., all New York. Out-of-store prices are 1c. higher

Cast-Iron Pipe.—Shops are fairly busy at the present time, but very little new business is in prospect either for municipalities or for general commercial purposes. Government prices, including the new freight rate, are as follows: $61.75, New York, for 6-in. and heavier, and $64.75 for 4-in.; $71.75 for 3-in., with $1 additional for Class A and gas pipe.

Old Material.—The demand for all kinds of scrap is active, the car supply is more satisfactory, and generally speaking the lot of the scrap dealer is a happier

one than it has been for some time. While the advance in freight rates has caused some complaint, there is not much disposition to object to either the new freight rates or the reaffirmation of prices on scrap, although some changes in specifications on two or three grades of scrap are expected. The freight rate from New York to eastern Pennsylvania is now $2.80 and the tax 8c., while the rate to Pittsburgh is $4 and the tax 12c., but units in the Pittsburgh district are absorbing the difference between the rate to that district and the rate to eastern Pennsylvania. We quote prices of brokers to New York producers and dealers as follows, per gross ton, New York:

Heavy melting steel	$26.20
Rerolling rails	30.80
Relaying rails	$60.00 to 70.00
Iron and steel car axles	43.70
No. 1 railroad wrought	30.80
No. 1 railroad wrought cut to not less than 10 in. or over 24 in.	35.80
Wrought-iron track scrap	28.80
Forge fire	23.50 to 24.00
No. 1 yard wrought long	28.80
Light iron	10.00 to 11.00
Cast borings (clean)	15.30 to 15.80
Machine-shop turnings	15.30 to 15.80
Mixed borings and turnings	15.05 to 15.35
Iron and steel pipe (1 in. minimum diameter), not under 2 ft. long	29.30 to 30.80
Stove plate	22.50 to 23.00
Locomotive grate bars	22.00 to 22.50
Malleable cast (railroad)	30.30 to 30.80
Old carwheels	25.80

Prices which dealers in New York and Brooklyn are quoting to local foundries, per gross ton, are:

No. 1 machinery cast	$34.00
No. 1 heavy cast (columns, building materials, etc.), cupola size	34.00
No. 1 heavy cast, not cupola size	29.00
No. 1 cast (radiators, cast boilers, etc.)	$27.00 to 28.00

Cincinnati

CINCINNATI, June 25.—(*By Wire*).

Pig Iron.—The new freight rates that went into effect to-day have caused some confusion, but according to a freight tariff supplement issued the rate from Birmingham proper to Cincinnati is now $3.60 instead of the old rate of $2.90. From Ironton to Cincinnati the rate figures out evenly $1.50 per ton. It is reported that the Southern furnaces are very much disappointed because no advance in prices was granted for the third quarter, and it is also rumored that at least one Tennessee furnace will either have to close down or else operate at a heavy loss. The increases in freight rates on coke and ore as well as other supplies, coupled with the high cost of labor, are largely responsible for the advance in the cost of producing iron in the South. The labor situation in the Ironton district is also causing some anxiety and the new "work or fight" order has only relieved furnace operators there to a limited extent. No iron is to be had for either prompt or future shipment with the exception of a few carloads of high sulphur metal in the South that is not suited for shipment on former contracts. This iron is not hard to dispose of and a much larger tonnage would be taken if it were available. Formal instructions as to priority orders have not yet been issued, but the furnaces are very careful to see that no iron is shipped to concerns not on the essential list.

Based on freight rates of $3.60 from Birmingham and $1.50 Ironton, we quote f.o.b. Cincinnati, as follows:

Southern coke, No. 2 foundry and No. 2 soft	$36.60
Southern Ohio, No. 2	34.50
Basic, Northern	33.50

Finished Material.—Some of the jobbers report shipments from the mills as coming forward at a better rate, but stocks on hand are becoming depleted. There is an extra heavy demand for barbed wire from the hardware trade, but none can be had with the exception of an occasional carload that was ordered some time ago. Wire nails are also scarce, but the demand for them is not as urgent as for barbed wire. Information received that no changes will be made in prices on July 1 steadies the situation to a certain extent, but the increase in freight rates is causing some trouble in the adjusting of current quotations. It will probably be several days before these adjustments will be completed. Steel pipe is very hard to get and no sales are made to anyone not producing a priority order. The jobbers are quoting 45 per cent off list for shipments from stock, but this discount is on a Pittsburgh basis and applies on both carloads and less than carload quantities.

Coke.—The new freight rates will increase the cost of fuel probably more than the average consumer expected. Some consumers have their pet brands and are loath to order from producing points that would mean a shorter haul. The action of the Government in fixing flat rate advances is looked on with more favor than in increasing all rates 25 per cent, as has been done on other commodities. No contracts have been made within the past few days. Only a few odd cars have been sold lately, and these are for prompt movement. Shipments from the Connellsville field are moving faster than from other districts, but the labor shortage is a handicap in all fields.

Old Material.—The change in freight rates is said by a prominent dealer to mean that prices will be weaker instead of going up as was expected. However, cast borings and steel turnings have both showed more strength and have been marked up 50c. a ton. It is generally understood that the Government's idea is to have scrap distributed to the nearest consuming points, and if this policy is carried out it will mean the cutting off in a large measure of shipments to outside districts. It is too early to state what effect the new order will have. Yard stocks are being reduced and there is very little scrap offered. The following are dealers' prices, f.o.b. at yards, southern Ohio and Cincinnati:

Per Gross Ton

Bundled sheet scrap	$21.00 to $21.50
Old iron rails	33.50 to 34.00
Relaying rails, 50 lb. and up	44.50 to 45.00
Rerolling steel rails	32.00 to 32.50
Heavy melting steel scrap	27.50 to 28.00
Steel rails for melting	27.50 to 28.00
Old carwheels	28.50 to 29.00

Per Net Ton

No. 1 railroad wrought	$29.00 to $29.50
Cast borings	14.00 to 14.50
Steel turnings	14.00 to 14.50
Railroad cast	25.00 to 25.50
No. 1 machinery	26.00 to 26.50
Burnt scrap	17.50 to 18.00
Iron axles	40.00 to 40.50
Locomotive tires (smooth inside)	35.50 to 36.00
Pipes and flues	21.00 to 21.50
Malleable cast	24.50 to 25.00
Railroad tank and sheet	18.50 to 19.00

Cleveland

CLEVELAND, June 25.

Iron Ore.—The increase of 45c. a gross ton for iron ore decided upon in Washington last week after a conference between representatives of the American Iron and Steel Institute, the War Industries Board and the committee of the independent ore producers was a disappointment to the ore men, who hoped that the Government would make a much larger increase to cover the freight and wage advances. This advance leaves little for the ore producers to cover the recent advance in wages and other increasing costs after the increase in freight rates from the mines to the upper Lake docks ranging from 29c. to 36.5c. is taken out. It is claimed by the ore men that operators of underground properties will not be able to more than about break even with the advanced price, and that a further advance for next year will be necessary. The War Industries Board in limiting the advance to 45c. seemed to feel that pig iron producers could absorb an advance to this extent, increasing the cost of making pig iron approximately $1 a ton, but should a greater advance have been made on ore, a general readjustment of prices on a higher level would have been made necessary for pig iron, semi-finished steel and finished steel. Announcement is made by the tariff departments of the railroads that ore on docks and in transit June 25 will not bear any

increase in freight rates. This will be good news to the consumers, as it had been the general opinion of ore men that this ore, not having paid an increased rate from the mines to upper Lake docks, would have to pay an increased rate of 33.6c. per gross ton from the lower Lake ports to the consuming points. Ore from Canadian mines will not pay an increased rate to upper Lake docks, as these shipments are made on Canadian railroads. Consequently this ore when shipped from lower Lake docks to consuming points will bear the advance that American ore pays for the haul from mines to upper Lake docks. The new rate on Canadian ore from Lake Erie docks is $1 per gross ton to Valley points and Canton, and $1.20 to the Pittsburgh district, these rates being for direct shipments. The ore movement is very heavy, and it is believed that June shipments will exceed 10,000,000 tons. Ore prices, f.o.w., lower Lake ports, effective July 1, are as follows:

Old range Bessemer, $6.40; old range non-Bessemer, $5.65; Mesaba Bessemer, $6.15; Mesaba non-Bessemer, $5.50.

Pig Iron.—The demand for pig iron from consumers who are asking the Government to provide for their requirements is increasing from week to week, and the pig iron committee which is allocating this iron is finding it increasingly difficult to make allocations. New inquiries that developed during the week aggregate round tonnages in basic, Bessemer, foundry and malleable iron. While most producers have asked their customers to secure priority certificates, they are not requiring these certificates from foundries which they know are engaged in war work. The replies to the questionnaire are aiding them largely in determining whether a foundry that asks for shipments on a contract should be furnished the iron. By following this general policy, producers are avoiding putting their iron in stock piles until priority certificates are secured. All the furnaces with the exception of about 10 have sent to the pig iron committee their reports recently asked for in the survey to determine the Government requirements and the proportion of the product of consumers that is going into war essential and non-essential work. The remainder of these reports are expected to come in during the week, but it will take some time to compile the information contained in the report. Pig iron allocations during the week include the following: 1500 tons of basic to a Verona, Pa., plant; 1000 tons of foundry to a York, Pa., consumer; 6000 tons of malleable for the Western plants of the American Car & Foundry Co.; 1000 tons of foundry to a Pacific Coast shipbuilding plant; 250 tons of low phosphorus iron to a Pittsburgh district plant; 200 tons of foundry to a Holland, Mich., plant; 1000 tons of Bessemer and 200 tons of foundry iron to District of Columbia plants; 325 tons of foundry iron to a Florence, N. J., consumer; 125 tons of charcoal iron to Ampere, N. J.; 400 tons of foundry iron to Anderson, Ind., and 150 tons of malleable and 200 tons of foundry iron to South Bend, Ind. Under the new railroad tariffs effective June 25 the freight rate on pig iron between important points in the Central West are as follows: Valley to Cleveland and Pittsburgh, $1.40; Cleveland to Pittsburgh, $2.10; Cleveland to Canton and Massillon, $1.40; Cleveland to Akron, $1.30; Cleveland to Erie, $1.40; Cleveland to Detroit, $2.40; Cleveland and Toledo to Lorain, $1.40; Southern Ohio points to Cleveland, Canton and Akron, $2.40; Southern Ohio to Youngstown and most other Valley points, $2.50; Cleveland to Middletown, and Newport, Ky., $2.60; Cleveland to Portsmouth, $2.50; Toledo to Detroit, $1.10; Toledo to Indianapolis, $2.30. Cleveland switching charges will be materially increased to 40c., the present rate being 30c., but all new switching rates have not been announced. We quote, delivered, Cleveland, subject to advance in switching rates on local iron, as follows:

Bessemer	$36.60
Basic	33.40
Northern No. 2 foundry	33.40
Southern No. 2 foundry	38.00
Gray forge	32.30
Ohio silvery, 8 per cent silicon	47.40
Standard low phosphorus, Valley furnace	53.00

Coke.—Foundries have received copies of a circular letter sent out by the Fuel Administration stating that in order to meet requirements of Southern interests engaged in Government work, it is necessary to curtail greatly the movement of coke from the New River, Pocahontas and Wise County districts to points north of the Ohio River, and shipments may be cut off without notice at an early date. The trade is advised to make arrangements to secure coke supplies from points north of these districts. Considerable Wise County coke has been consumed in the Cleveland district, but contracts for this fuel are about completed as producers have taken no contracts for delivery in this territory after July 1. Some Cleveland foundries are still securing Connellsville coke, but under its zone system the Government plans to have the foundry coke for this immediate territory supplied as far as possible from Cleveland by-product plants. There is an active demand for Cleveland by-product coke which is available for early shipment. Many foundries are putting in a stock of this coke. Under the new railroad tariff, the freight rate on Connellsville coke to Cleveland has been increased from $1.75 to $2.15.

Bolts, Nuts and Rivets.—Rivet manufacturers are notifying their trade that priority certificates must be furnished for all orders, including unfilled orders already on their books. When these certificates are supplied, the orders will be properly classified, and manufacturers say there is little prospect for consumers getting deliveries unless they can furnish Class A and B priority orders. Considerable business is coming from consumers whose requirements will not come in these classifications. There is a good demand for rivets in small miscellaneous orders, and manufacturers are able to keep up fairly well on the large specifications that are coming from shipyards.

Old Material.—The scrap trade has been marking time, awaiting an announcement regarding third quarter prices, and activity during the week was confined largely to car lot trading between dealers. The trade generally is well suited with the reaffirmation of the present prices. Turnings are very plentiful, and the price of these is not firm. Dealers are offering $30 gross for busheling scrap, and sales of this grade are reported at $31, and for future delivery at the Government price of $32. Foundry cast scrap is slightly firmer, and sales are reported at $31.50 and $32. Because of the scarcity of pig iron, some foundries are using a much larger percentage of scrap than they do in normal times. We quote, f.o.b., delivered at consumers' yards in Cleveland and vicinity, as follows:

Per Gross Ton

Steel rails	$27.00 to $28.00
Steel rails, rerolling	34.00
Steel rails, under 3 ft	34.50
Iron rails	39.00
Iron car axles	46.50
Steel car axles	46.50
Heavy melting steel	29.00
Cast borings	18.00 to 18.50
Iron and steel turnings and drillings	18.00 to 18.25
No. 1 railroad wrought	34.00
Hydraulic compressed sheet scrap	28.00 to 29.00
Cast-iron car wheels, unbroken	29.00
Cast-iron car wheels, broken	34.00
Agricultural malleable	24.00 to 25.00
Railroad malleable	34.00
Steel axle turnings	24.00
Light bundled sheet scrap	24.50 to 25.00
Cast-iron scrap	29.00
Cast-iron scrap, broken to cupola size	31.50 to 32.00
No. 1 busheling	29.75 to 30.50

Per Net Ton

Railroad grate bars	22.00 to 22.50
Stove plate	22.00 to 22.50

Finished Iron and Steel.—Mills generally are not requiring consumers to secure priority certificates for steel, but some orders are being taken for essential work without these certificates. Demand is rather light, although jobbers are getting a good volume of business. The Government has allocated hull steel for additional boats recently placed for next year with the American Shipbuilding Co., material for 38 of which was allocated to the Carnegie Steel Co. a few days ago. The Lackawanna Steel Co. is given 5085 tons and the Otis Steel Co. 6000 tons for the Buffalo and Cleveland shipyards and the Illinois Steel Co. 19,240 tons for the Chicago and Superior shipyards. Many of the automobile manufacturers have been able to keep up a fair volume of production because of having accumulated large stocks before Government restrictions were placed on steel, and where they are in lack of material for

certain parts they are able to secure this in many cases by buying shell discard and having it rolled to meet their requirements. Some mills are operating only on part time bar mills that roll sizes that are not in heavy demand for Government work. In structural work the King Bridge Co. has taken 200 tons for a locomotive shop for the New York Central Railroad in Collinwood. It is understood that the Government has fixed a price of $60 to $65 for shell steel for rolling light rails. This is particularly interesting in view of the fact that prices have not yet been named on standard rails. Orders for about 15,000 tons of galvanized sheets for railroad cars have been placed with several mills. Freight advances on finished steel from Pittsburgh to Cleveland are from 13.5c. to 17c. on carload shipments and 19c. to 24.50c. on less than carloads. Warehouse prices were marked up to-day to cover these advances. We quote warehouse prices as follows:

Steel bars, 4.07c.; plates, 4.42c.; structural material, 4.17c.; No. 10 blue annealed sheets, 5.42c.; No. 28 black sheets, 6.17c.; No. 28 galvanized sheets, 7.67c.

Spinel in Blast-Furnace Slags

The question of the conditions favoring the formation of spinel in blast-furnace slags and an explanation of the impurities which sometimes occur in the silica portion of a slag treated by the hydrochloric acid method were discussed recently by A. Marshall Le Tellier, chief chemist, Wickwire Steel Co. He said, in part:

This impurity occurring with the silica from the slag is a definite compound of magnesium and aluminum, commonly called spinel, and known to the chemist as magnesium aluminate, having the formula $Mg(AlO_2)_2$. This compound or substance theoretically contains 28.29 per cent magnesia and 71.71 per cent alumina and by actual analysis covering months of blast-furnace practice the substance was found to always occur in this proportion. The chemist can readily see the saving of time in the routine analysis of slags by volatilizing the silica with hydrofluoric acid and calculating the percentage of the magnesia and alumina in the residue without further analysis.

As to the conditions favoring the formation of spinel in blast-furnace slags, there are three, as follows: The magnesia content must be over 10 per cent, the alumina content must be over 12 per cent and the silica content must be not more than 33 per cent.

Regardless of the alumina and magnesia content of a slag, spinel will not form in a "lean" or acid slag; the analyses below, taken from actual routine analysis, prove this interesting fact.

Sample	Silica, Per Cent	Alumina, Per Cent	Magnesia, Per Cent	Spinel, Per Cent
No. 1	34.16	15.10	14.08	None
No. 2	33.68	14.77	15.41	Trace
No. 3	32.00	14.81	14.67	0.70
No. 4	30.30	15.09	14.86	2.40
No. 5	29.16	14.93	15.06	5.03

The explanation seems to be that when there is an insufficient amount of silica to combine with the lime and magnesia, which means a basic slag, that a part of the magnesia combines with the alumina in place of the silicia, forming the very insoluble and inactive compound of spinel, which is often reported by the chemist as silica. [In THE IRON AGE, April 25, 1918, p. 1093, the solubility of such slags was discussed by Edward C. James.]

The opening of a new deposit of iron ore in Marinette County, Wis., is indicated by the results of surface exploration which has been under way for some time and has been so encouraging that a corporation is being organized under the name of Marinette Exploration, Development & Mining Co. of Marinette, to undertake the work of sinking test pits and carrying on underground development work. Options have been taken on various tracts of land near McAllister, Wagner and Goll. The territory takes in a strip of seven miles, beginning at the Menominee River, which is believed to be a continuation of the Menominee range. Thomas Plouff, Marinette, is among those behind the project.

IRON AND INDUSTRIAL STOCKS

Transactions Rather Quiescent, All War News Having Only Minor Influence on Prices

New York, June 24.

Stock market transactions have been monopolized the past week by professional traders, the public, while pleased by the Italian victory, apparently holding back pending further German assaults in France. Prices maintained generally a strong tone, with trading most active among the industrial shares. The steel stocks changed but little. United States Steel, com., rose 1⅞ points; pref. fell off ⅝; Bethlehem Steel, com., rose 1; class B, 1⅛; 8s pref. fell off ⅞; Midvale, com., rose ¼; Crucible, com., ⅛; pref., ¾. Gains and losses among the metal-working company issues about balanced up. One or two, however, made good gains, Baldwin Locomotive, com., advancing 4⅝ and Pressed Steel Car, com., 6 points.

The range of prices on active iron and industrial stocks from Tuesday of last week to Wednesday of this week was as follows:

Allis-Chalm. com.	33¼ - 35⅛	Int. Har. Corp. com.	62 - 65
Allis-Chalm. pf.	84⅛ - 85	Lackaw. Steel	83 - 85⅛
Am. Can com.	45⅝ - 47½	Lake Sup. Corp.	16½ - 17½
Am. Can pf.	94½ - 94¾	Midvale Steel	51⅛ - 53¾
Am. Car & Fdry. com.	80½ - 84¼	Nat.-Acme	30½ - 31
Am. Loco. com.	66⅝ - 68¼	Nat. Enam. & Stm. com.	51 - 52
Am. Loco. pf.	98	N. Y. Air Brake	127
Am. Ship com.	125¼ - 135	Nova Scotia Steel.	57 - 60
Am. Steel Fdries.	64½ - 67½	Pressed Stl. com.	64¾ - 69¾
Bald. Loco. com.	88½ - 96¾	Pressed Steel pf.	94⅛
Bald. Loco. pf.	100	Ry. Steel Spring com.	53¼ - 57¾
Beth. Steel com.	84½ - 85	Ry. Steel Spring pf.	91¾ - 92⅝
Beth. Steel Cl. B.	81¾ - 87¼	Republic com.	89⅞ - 93¼
Cambria Steel	130	Republic pf.	99 - 99½
Carbon Steel com.	118 - 123	Sloss com.	64¼ - 66½
Cent. Fdry. com.	35½ - 37	Sloss pf.	93
Central Fdry. pf.	45½ - 48	Superior Steel	41¾ - 43¾
Charcoal Iron pf.	6⅜	Transue-Williams	40 - 40¾
Chic. Pneu. Tool.	68½ - 71	Un. Alloy Steel	39 - 40⅜
Colo. Fuel	49 - 50½	U. S. Pipe com.	14¼ - 15½
Cruc. Steel com.	64¼ - 68	U. S. Pipe pf.	44 - 44½
Cruc. Steel pf.	90⅛ - 90¾	U. S. Steel com.	102⅞ - 109⅝
Gen. Electric	146 - 149½	U. S. Steel pf.	111 - 111⅞
Gt. No. Ore Cert.	32½ - 34½	Va. I. C. & Coke.	72 - 72½
Gulf States Steel.	86	Warwick.	8 - 8½
Int. Har. of N. J. com.	127¾ - 128	Westingh. Elec.	43¼ - 44½
Int. Har. of N. J. pf.	110		

TO ALLOT COMMON LABOR

Government Employment Service to Provide Requirements of War Industries

WASHINGTON, June 25.—The United States Employment Service of the Department of Labor to-day began an approximation of the common labor requirements of war industries of the country for the next three months and of the common labor reserves in each State which may be utilized for war production. With these two national estimates as a basis the Federal Employment Service will allot the quotas of unskilled workers which each state will be called upon to furnish.

The war industries will report their needs to the employment service by means of a special form, issued to each industry through the particular Government department or board with which its contract is placed. The form asks the immediate common labor requirements, and estimate of the weekly requirements from July 15 through August, and a lump estimate of needs from Sept. 1 to Oct. 1.

Mines Will Be Worked by Chinese Government

An Associated Press dispatch from Shanghai says an agreement has been virtually concluded between the Chinese and Japanese governments, according to report by the North China *News*, under which the iron mines at Feng Huan Shan will be worked by the Chinese Government and steel will be manufactured by the Chinese and Japanese. It is said that the Japanese will provide 20,000,000 yen to defray the expense of carrying out the work.

This means, it is said, that the Japanese will virtually acquire control of the entire output of the mines. The signing of the agreement is pending.

Metal Markets

The Week's Prices

Cents per Pound for Early Delivery

June	Copper, New York, Lake	Copper, New York, Electrolytic	Tin, New York	Lead, New York	Lead, St. Louis	Spelter, New York	Spelter, St. Louis
19	23.50	23.50	*92.00	7.82½	7.75	8.25	8.00
20	23.50	23.50	*92.00	7.82½	7.75	8.50	8.25
21	23.50	23.50	*92.00	7.82½	7.75	8.50	8.25
22	23.50	23.50	*92.00	7.82½	7.75	8.50	8.25
24	23.50	23.50	*92.00	7.82½	7.75	8.50	8.25
25	23.50	23.50	*92.00	7.82½	7.75	8.62½	8.37½

*Nominal.

June 26, 1918.

The markets are stronger than a week ago, advances being due in part to the new freight rates. Government demand continues heavy for copper. Tin is stronger with light trading. Lead is very strong. Spelter continues to advance.

Copper.—No official word has come out of Washington as to fixed prices for copper for the third quarter. It is intimated in some quarters that producers are expecting a slight advance, which will be a compromise between the present price and the 25c. which they asked for. The Government continues to take from 80 to 90 per cent of the output and the copper companies are principally concerned with efforts to increase production. Exports of copper in May were 28,889 tons, a total of 150,995 tons for the year to June 1, which is less than three-quarters of the exports for the same period last year.

Tin.—Tin is exceedingly quiet. Trading during the week under review has not exceeded 250 to 300 tons, and this was mostly for future shipment. The uncertainty as to freight rates has had a deterrent influence upon transactions. It is said that the new rate will be $1.25 per cwt. from the Pacific Coast to New York, but until this is finally settled a rate based on the value of the shipments may prevail, which would make the rate $2.81½. There are vague rumors of a price-fixing policy on tin, but nothing definite can be learned as to this. A steamer has arrived within the week at San Francisco with 750 tons of Banca tin, which will probably come east. The London market shows a slight decline since a week ago, spot Straits being quoted yesterday at £332, compared with £239 last week.

Lead.—Lead has shown considerable strength during the week, but prices have not advanced, the larger producers, in fear of Government price fixing, having fixed by their own agreement a maximum price of 7.75c., St. Louis. In normal times the present conditions would produce a runaway market, as demand is exceedingly strong, being much greater than the supply. There is strong pressure for deliveries over the summer months, and it appears that buyers will not be able to get their wants fully satisfied.

Spelter.—Spelter has continued its advance during the past week, and yesterday prime Western for nearby delivery was quoted at 8.37½c., St. Louis, a rise of ⅝c. per lb. in the week. In the outside market quotations as high as 8.75c., St. Louis, are heard. In the opinion of producers spelter has for some time been selling at too low a level, the spread between the cost of the ore and the price of spelter being insufficient, they say, to cover conversion costs and leave a reasonable profit. Companies which mine on a royalty basis have sold the ore at prices which the large producers say do not fully cover their costs.

Antimony.—Antimony is quoted at 13c. to 13.12½c. for lots of 25 tons and over, while smaller lots may be had at 13.25c., New York.

Aluminum.—Government maximum prices establish the market for No. 1 virgin metal, 98 to 99 per cent pure, at 33c. per lb. for 50-ton lots, 33.10c. per lb. for lots of 15 to 50 tons and 33.20c. per lb. for lots of 1 to 15 tons.

Old Metals.—The market is very quiet. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible	23.50
Copper, heavy and wire	23.50
Copper, light and bottoms	21.00 to 21.50
Brass, heavy	16.00 to 16.25
Brass, light	11.50 to 12.00
Heavy machine composition	24.25 to 24.75
No. 1 yellow rod brass turnings	13.00 to 13.50
No. 1 red brass or composition turnings	20.50 to 21.00
Lead, heavy	7.00
Lead, tea	6.00
Zinc	6.25

Chicago

JUNE 25.—No particular interest is shown in copper. The spot buyer has some difficulty obtaining the metal but those that have bought ahead are well supplied. Tin is stronger, although the market is not excited. Large consumers are well cared for but there is some specifying every day. Spot metal is scarce and 60 to 90 day shipments are not easily obtainable. Lead is strong with the independents asking considerably higher prices than the leading interest, which is 7.75c., St. Louis, a price at which no lead is offered. Spelter is stronger and in fair demand. Antimony is dull. We quote copper at 23.50c. for carloads and 24.67½c. less than carloads; tin, 95c. to $1; lead, 7.87½c. to 8.12½c.; spelter, 8.37½c. to 8.62½c.; antimony, 14c. to 15c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 21c.; copper clips, 21c.; copper bottoms, 19c.; red brass, 21c.; yellow brass, 14c.; lead pipe, 6c.; zinc, 5.50c.; pewter, No. 1, 55c.; tinfoil, 65c.; block tin, 70c.

St. Louis

JUNE 24.—The market has been quiet but firm the past week. Lead is strong and in demand at 7.75c. for carloads; spelter, 8.37½c. In less than carloads quotations are: Lead, 8.25c.; spelter, 9c. to 9.12½c.; tin, $1.10 and unobtainable; copper, 25.12½c.; antimony, 15c. In the Joplin district top grade ores sold at $75 per ton, basis 60 per cent in zinc blende, with second grades ranging down to about $50. The weekly average was about $57.50 per ton with an increasing tendency toward better prices because of the firmness in spelter. Calamine sold from $30 to $34 per ton, basis of 40 per cent, with the average for the week at $32. Lead was very firm and sold up to $87.50 with some sales reported at $90, basis 80 per cent. The weekly average was $88 per ton. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 10c.; heavy yellow brass, 14c.; heavy red brass and light copper, 19.50c.; heavy copper and copper wire, 20c.; pewter, 30c.; tinfoil, 60c.; lead, 5.50c.; tea lead, 5c.; zinc, 5c.

Determination of Moisture in Coke

Conditions governing the determination of moisture in coke have been summarized as follows by A. C. Fieldman and W. A. Selvig of the Bureau of Mines at Washington:

Investigation shows that the influence of temperature, time, humidity of the drying atmosphere and fineness of sample on the determination of moisture in coke may be varied over a considerable range without affecting the result appreciably. Oven temperatures ranging from 105 to 200 deg. C. produced a maximum variation in moisture of not exceeding 0.3 per cent.

Coke can be dried to constant weight without the usually specified preliminary air-drying.

The circulation of air dried by sulphuric acid through the oven atmosphere, as specified for coal analysis, is unnecessary in the case of coke analysis, there being no measurable difference of results between circulating perfectly dry air through the oven and using in the oven the natural air from the room.

Moisture can be determined quickly and with adequate accuracy by simply heating to constant weight a large sample of lump coke in any convenient oven, or on a stove, hot plate, or steam coil at a temperature of 100 to 200 deg. C. Because of its simplicity and flexibility this method may be used advantageously at points where coke consignments are sampled.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

Effective on and after June 25, 1918, an advance in freight rates of 25 per cent from Pittsburgh on iron and steel articles and also on wrought iron and steel pipe went into effect. The new rates from Pittsburgh on iron and steel articles, in carloads, to points named, per 100 lb. are as follows: New York, 24.5c.; Philadelphia, 23c.; Boston, 27c.; Buffalo, 17c.; Cleveland, 17c.; Cincinnati, 23c.; Indianapolis, 25c.; Chicago, 27c.; St. Louis, 34c.; Kansas City, 59c.; minimum carloads, 36,000 lb.; St. Paul, 49½c.; minimum carload, 36,000 lb.; Denver, 99c.; minimum carload, 36,000 lb.; Omaha, 59c.; minimum carload, 36,000 lb.; New Orleans, 38.5c.; Birmingham, 57.5c.; Pacific Coast, $1.25; minimum carload, 80,000 lb. To the Pacific Coast the rate on steel bars and structural steel is $1 315, minimum carload 40,000 lb.; and $1.25, minimum carload 50,000 lb. On wrought iron and steel pipe the rate from Pittsburgh to Kansas City is 50c. per 100 lb., minimum carload 46,000 lb.; to Omaha, 50c., minimum carload 46,000 lb.; to St. Paul and Minneapolis, 49.5c., minimum carload 46,000 lb.; Denver, 99c., minimum carload 46,000 lb. A 3 per cent transportation tax applies. On iron and steel items not noted above rates vary somewhat and are given in detail in the regular railroad tariffs.

Structural Material

I-beams, 3 to 15 in.; channels, 3 to 15 in. angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees, structural sizes, 3c.

Wire Products

Wire nails, $3.50 base per keg; galvanized, 1 in. and longer, including large-head barb roofing nails taking an advance over this price of $2, and shorter than 1 in., $2.50. Bright basic wire, $3.35 per 100 lb.; annealed fence wire, Nos. 6 to 9, $3.25; galvanized wire, $3.95; galvanized barb wire and fence staples, $4.35; painted barb wire, $3.65; polished fence staples, $3.65; cement-coated nails, $3.40 base; these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 47 per cent off list for carload lots, 46 per cent for 1000-rod lots, and 45 per cent off for small lots, f.o.b. Pittsburgh.

Bolts, Nuts and Rivets

Large structural and ship rivets	$4.40 base
Large boiler rivets	$4.50
7/16 in. x 6 in. smaller and shorter rivets	50-10 per cent off list
Machine bolts h.p. nuts, ⅝ in. x 4 in.:	
Smaller and shorter, rolled threads	50-10-5 per cent off list
Cut threads	50-5 per cent off list
Larger and longer sizes	40-10 per cent off list
Machine bolts c.p.c. and t. nuts, ⅝ in. x 4 in.:	
Smaller and shorter	40-10 per cent off list
Larger and longer	35-5 per cent off list
Carriage bolts, ⅜ in. x 5 in.:	
Smaller and shorter, rolled threads	50-5 per cent off list
Cut threads	40-10 per cent off list
Larger and longer sizes	40 per cent off list
Lag bolts	50-10 per cent off list
Plow bolts, Nos. 1, 2, 3	50 per cent off list
Hot pressed nuts, sq., blank	2.50c. per lb. off list
Hot pressed nuts, hex., blank	2.30c. per lb. off list
Hot pressed nuts, sq., tapped	2.30c. per lb. off list
Hot pressed nuts, hex., tapped	2.10c. per lb. off list
C.p.c. and t. sq. and hex. nuts, blank	2.25c. per lb. off list
C.p.c. and t. sq. and hex. nuts, tapped	2.00c. per lb. off list
Semi-finished hex. nuts:	
⅝ in. and larger	60-10-10 per cent off list
9/16 in. and smaller	70-5 per cent off list
Stove bolts	70-10 per cent off list
Stove bolts	2½ per cent extra for bulk
Tire bolts	50-10-5 per cent off list

The above discounts are from present lists now in effect.

All prices carry standard extras.

Wire Rods

No. 5 common basic or Bessemer rods to domestic consumers, $57; chain rods, $65; screw, rivet and bolt rods and other rods of that character, $65. Prices on high carbon rods are irregular. They range from $70 to $80, depending on carbons.

Railroad Spikes and Track Bolts

Railroad spikes, 9/16 in. x 4½ in. and heavier, per 100 lb., $3.90, in lots of 200 kegs of 200 lb. each, or more: track bolts, $4.90. Boat spikes, $5.25 per 100 lb., f.o.b. Pittsburgh.

Terne Plate

Effective May 21 prices on all sizes of terne plates are as follows: 8-lb. coating, 200 lb., $15 per package: 8-lb. coating, I. C., $15.30; 12-lb. coating, I. C., $17.00; 15-lb. coating, I. C., $18.00; 20-lb. coating, I. C., $19.60; 25-lb coating, I. C., $20.60; 30-lb. coating, I. C., $21.75; 35-lb. coating, I. C., $22.75; 40-lb. coating, I. C., $24.00 per package, all f.o.b. Pittsburgh, freight added to point of delivery.

Iron and Steel Bars

Steel bars at 2.90c. from mill, and 4.50c. to 5c. from warehouse in small lots for prompt shipment. Refined iron bars, 3.50c. in carload and larger lots, f.o.b. mill.

Wrought Pipe

The following discounts are to jobbers for carload lots on the Pittsburgh basing card, as announced Nov. 5 by the Government on steel pipe, those on iron pipe being the same as quoted for some time:

Butt Weld

Steel: Inches	Black	Galv.	Iron: Inches	Black	Galv.
⅛, ¼ and ⅜	44	17½	⅛ and ¼	23	+4
½	48	33½	⅜	24	+3
¾ to 3	51	37½	½	28	10
			¾ to 1½	33	17

Lap Weld

2	44	31½	1¼	18	3
2½ to 6	47	34½	1½	25	11
7 to 12	44	30½	2	26	12
13 and 14	34½	..	2½ to 6	28	15
15	32	..	7 to 12	25	12

Butt Weld, extra strong, plain ends

⅛, ¼ and ⅜	40	22½	⅛, ¼ and ⅜	22	5
½	45	32½	½	27	14
¾ to 1½	49	36½	¾ to 1½	33	18
2 to 3	50	37½			

Lap Weld, extra strong, plain ends

2	42	30½	1¼	19	4
2½ to 4	45	33½	1½	25	11
4½ to 6	44	32½	2	27	14
7 to 8	40	26½	2½ to 4	29	17
9 to 12	35	21½	4½ to 6	28	16
			7 to 8	20	8
			9 to 12	15	3

To the large jobbing trade an additional 5 per cent is allowed over the above discounts, which are subject to the usual variations in weight of 5 per cent. Prices for less than carloads are four (4) points lower basing (higher price) than the above discounts on black and 5½ points on galvanized.

On butt and lap weld sizes of black iron pipe, discounts for less than carload lots to jobbers are seven (7) points lower (higher price) than carload lots, and on butt and lap weld galvanized iron pipe are nine (9) points lower (higher price).

Boiler Tubes

The following are the prices for carload lots, f.o.b. Pittsburgh, announced Nov. 13, as agreed upon by manufacturers and the Government:

Lap Welded Steel		*Charcoal Iron*	
3½ to 4½ in.	34	3½ to 4½ in.	12½
2½ to 3¼ in.	24	3 to 3¼ in.	+ 5
2¼ in.	17½	2½ to 2¾ in.	+ 7½
1¾ to 2 in.	13	2 to 2¼ in.	+22½
		1¾ to 1⅞ in.	+35

Standard Commercial Seamless—Cold Drawn or Hot Rolled

Per Net Ton		Per Net Ton	
1 in.	$340	1¾ in.	$220
1¼ in.	280	2 to 2½ in.	190
1⅝ in.	270	2¾ to 3¾ in.	180
1½ in.	220	4 in.	200
		4½ to 5 in.	220

These prices do not apply to special specifications for locomotive tubes nor to special specifications for tubes for the Navy Department, which will be subject to special negotiation.

Sheets

Makers' price for mill shipments on sheets of United States standard gage in carload and larger lots, are as follows:

Blue Annealed—Bessemer	Cents per lb.
No. 8 and heavier	4.20
Nos. 9 and 10	4.25
Nos. 11 and 12	4.30
Nos. 13 and 14	4.35
Nos. 15 and 16	4.45
Box Annealed, One Pass Cold Rolled—Bessemer	
Nos. 17 to 21	4.80
Nos. 22 and 24	4.85
Nos. 25 and 26	4.90
No. 27	4.95
No. 28	5.00
No. 29	5.10
No. 30	5.20
Galvanized Black Sheet Gage—Bessemer	
Nos. 10 and 11	5.25
Nos. 12 and 14	5.35
Nos. 15 and 16	5.50
Nos. 17 to 21	5.65
Nos. 22 and 24	5.80
Nos. 25 and 26	5.95
No. 27	6.10
No. 28	6.25
No. 29	6.50
No. 30	6.75
Tin-Mill Black Plate—Bessemer	
Nos. 15 and 16	4.80
Nos. 17 to 21	4.85
Nos. 22 to 24	4.90
Nos. 25 and 27	4.95
No. 28	5.00
No. 29	5.05
No. 30	5.05
Nos. 30½ and 31	5.10

OBITUARY

Dr. JAMES DOUGLAS, for many years president and lately chairman of the board of directors of the Phelps, Dodge Corporation, copper producer, died at his home in New York on June 25, in his eighty-first year. He was considered one of the foremost metal and mining authorities of the world, and was the recipient of the John Fritz medal for notable achievements in mining, metallurgy, education and industrial welfare. He was also the recipient of the gold medal of the Institution of Mining and Metallurgy of London, England. He was a member of many scientific societies and had served twice as president of the American Institute of Mining Engineers. In 1899 McGill University conferred upon him the honorary degree of doctor of laws and in 1916 he was elected chancellor of Queens University, his alma mater. He was born in Quebec, Canada, Nov. 4, 1837, and in his early days was a professor of chemistry at a Canadian college. He acquired his first experience in mining and metallurgy in Canada, but left there in 1875 to take charge of the metallurgical operations of the Chemical Copper Co., Phoenixville, Pa., where he was first to separate, on a commercial scale, the precious metals from the copper by the electrolytic process. He later became president of the Copper Queen Consolidated Mining Co., and other properties were acquired, which in 1918 were taken over by the Phelps, Dodge Corporation, of which he became president.

R. B. CARNAHAN, JR., vice-president of the American Rolling Mill Co., Middletown, Ohio, accidentally shot himself at his home on June 22, death resulting. Mr. Carnahan had just finished a letter to Mrs. Carnahan, who was visiting at Montclair, N. J., telling her he was going out for target practice. A rug slipped beneath his feet, and in trying to break his fall he struck a vase on the stairway, and this presumably discharged the revolver. The bullet entered his head over his left eye. His body was not found until several hours after the accident. Mr. Carnahan was a metallurgist of national repute, being the inventor of "Armco" iron, a rust-resisting product, which has made him and his company known the world over. As a result of experiments in perfecting pure iron products he held many valuable patents. He was to have left Middletown the afternoon of his death to attend a convention of the American Society for Testing Materials at Atlantic City, N. J.

WILLIAM F. ANDERSON, 54 years of age, formerly head of the George S. Anderson Co., foundry operator, Jeffersonville, Ind., died on June 20 of heart disease. The company was established in Jeffersonville 70 years ago by his grandfather, Charles C. Anderson, and passed out of the Anderson family only a few years ago.

HUGH HANNAN, head of the Hannan-Finton Co., machinist and machinery dealer, died at his home in Springfield, Mass., June 17. He went to Springfield about 51 years ago and shortly after started to learn the machinist's trade and had been engaged in that line of business ever since.

The Federal Board for Vocational Education has just issued the "Evolution of National Systems of Vocational Education for Disabled Soldiers," being Bulletin No. 15 of the series of this board, of which Dr. C. A. Prosser is the director. The Bulletin is a volume of 320 pages, illustrated with photographs showing progress made in other countries in refitting men for civil life. Copies may be had without cost upon application to the Federal Board for Vocational Education, Ouray Building, Washington, D. C.

The Leesport blast furnace, situated at Leesport, Pa., which had been idle for 10 years, will be put into operation in the next few weeks. The furnace is being rebuilt and enlarged.

Investigation of Canadian Car & Foundry Co. Demanded

An investigation of the affairs of the Canadian Car & Foundry Co., Ltd., is demanded in a circular to the stockholders from a special committee representing Montreal and New York interests. The committee invites proxies to be voted at the annual meeting on July 15.

Among other things the committee says "it appears from the records that commissions running into millions have been directly or indirectly authorized by the board without details being disclosed." The commissions on the company's $83,000,000 contract with Russia, obtained in 1915, it is charged, apparently exceeded the whole net profits on that transaction.

It is also charged that since the publication of the company's last annual report a commission or bonus of $50,000 was authorized to be paid to the president as a consideration for his indorsement of a subsidiary company's note amounting to $400,000. In this connection the committee's letter states that the recent declaration of a 3½ per cent dividend on the preferred stock was intended as a sop to win back the favor of the stockholders and balk the investigation which the proxy committee deems essential. The full statement bearing on the Russian contract says:

"In 1915 the company obtained from the Russian government shell contracts aggregating $83,000,000, and at a time when the management expected apparently to make a profit of approximately $15,000,000 the president obtained from the board the adoption of a resolution transferring to him personally half of all net profits of the company from such contracts, over and above $5,000,000. Consider the result of such an unusual bargain between the company and its chief officer. If the management's estimates had been even approximately realized the company would have made $10,000,000 profit and the chief executive $5,000,000. True, the company made no such profit, and neither did the president, but a very bad principle, indeed, was involved and consecrated."

"The stockholders of the Canadian Car & Foundry Co., Ltd.," the committee's circular adds, "have experienced a most profitable investment for the past few years; the suspension of dividends, the tremendous shrinkage in share values and an undercurrent of rumors of which 'bad management' has been the mildest expression."

Regulation for House Heater Manufacture

The conservation division of the War Industries Board has promulgated a program for manufacturers of house heaters with a view to conserving iron and steel. This program will be made effective unless substantial reasons are immediately presented to show that by some modification the needs of the Government can be met more effectually.

The program embraces the following features:

1. The immediate discontinuance of the manufacture of new patterns for the duration of the war.

2. Each manufacturer to limit his line to not more than three styles of heaters for the duration of the war. (Either cast or steel radiators may be used for each style if desired; each so-called pipeless type to be included as one of the above three styles.)

3. Each manufacturer to limit his line to not more than five sizes for each style of heater.

4. The manufacturer of firepot size of a rating less than 19 in. to be discontinued.

5. Pokers, scrapers, shovels, draft regulators and chains to be furnished only as extras.

Employees of the Upson Nut Co., Unionville, Conn., are on strike for a 9-hr. day with no reduction of pay from the present 10-hr. schedule. The men were told that an increase in wages would be granted to such as merited it, but pay for 10 hr. would not be given for a work-day of 9 hr.

CONSERVATION DISCUSSED

Meeting at Bridgeport of Manufacturers and Engineers

A joint coal conservation meeting was held in Bridgeport, Conn., June 21, under the auspices of the Bridgeport Manufacturers' Association, the Bridgeport section American Society of Mechanical Engineers and the Bridgeport Chamber of Commerce. The principal speakers at the meeting were Charles T. Main, president; Dr. Ira N. Hollis, past president A. S. M. E., and president Worcester Polytechnic Institute, and L. P. Breckenridge, professor of mechanical engineering, Sheffield Scientific School, Yale University.

Mr. Main spoke of the movement initiated by the New York section of the A. S. M. E. to form a committee to study the proper utilization of non-essential plants, of the aid the members of the society could be to the regional directors of the Resources and Conversion section of the War Industries Board in studying the facilities and planning the reorganization of industries for usefulness in the war program, and of the need of heavy machine tools. He announced that the A. S. M. E. committee on machine shop practice would also serve as a committee to develop facilities for the manufacture of the needed heavy tools.

Dr. Hollis said that the present study of coal conservation would bring about a sympathetic understanding of the problem of conserving all our national resources. The least disturbance to industry would be secured by saving at least 20 per cent by eliminating waste. It had been predicted, he continued, that this could be easily saved and would virtually make up the expected shortage of coal in New England. In order to bring about this saving it would be necessary to interest every man in the shop, and this could not be done by regulation; it must be done by inspiration. He pleaded for the organization in each factory of its own fuel committee so that there would be a body with a direct interest in this effort and a direct responsibility for results.

Professor Breckenridge outlined a way to accomplish the desired saving of coal. He stated that each plant should have a plant fuel engineer in charge of economy; that there should be monthly meetings of the plant fuel engineers in each locality for the exchange of information; that there should be a local coal conservation committee which should co-operate with the state administrative engineer of the Fuel Administration and give aid and suggestions as to the local situation; that the owners and managers must give strong support and financial backing to sensible economy plans. He outlined the plan of the Fuel Administration for the inspection and classification of power plants which will divide power plants into five classes. The man whose plant was rated in the lowest class (fifth) might find his coal supply shut off if the coal crisis became acute. Professor Breckenridge distributed leaflets prepared for the use of Connecticut power plants, especially applicable to small and medium-sized plants.

About 400 machinists employed by Smith & Wesson, Springfield, Mass., engaged in the manufacture of pistols for the Government, have voted to strike if demands presented to the management are not granted. The workmen are asking for a 48-hr. week, time and half time for overtime, double time for Sundays and holidays, a wage increase of 25 per cent, and the elimination of the system of making employees buy their own supplies, such as oils, drills and waste. They also ask for the reinstatement of all employees who have been discharged for activity in the present wage controversy. It has been announced that H. R. Skeffington, federal conciliator, has been ordered to Springfield to bring about an adjustment of the controversy.

The Pittsburgh Tool Steel Wire Co. has let a contract for an addition to its plant at Monaca, Pa., to cost about $11,000, and will be in the market for some new equipment.

FIVE BILLIONS FOR MUNITIONS

The Government's Big Gun Program Involves a Fabulous Outlay

WASHINGTON, June 25.—A far-reaching program for the equipment of an army of nearly 4,000,000 men with the most approved types of light artillery and heavy ordnance in accordance with plans framed in the first instance by General Pershing and approved by the Allied War Council in Paris has been incorporated in a munitions bill reported to the House by the Committee on Appropriations and carrying the sum of $5,435,096,224. Although this enormous budget is known as the annual fortifications bill the committee reporting it denominates it "a bill to provide scientific armament for a modern army." Representative Borland, chairman of the subcommittee having the bill in charge, says concerning its provisions:

"I can draw from this program of big guns but one inference, and that is that the American army will be prepared to cross the Rhine in full force and full strength commensurate with any obstacle which it may encounter. The program of gun construction is so large that it has taxed to the utmost the production resources of the country. General Pershing is now purchasing in France field artillery equipment for 30 divisions of the American army. These orders are being met faster than our troops require them. It is calculated that all the field artillery and ammunition needed for the American forces in France between now and January, 1919, will be supplied from French resources, and in the meantime we will attain quantity production in this country.

"The big gun program will necessitate the construction of a complete United States manufacturing arsenal. One has been located on an island below Pittsburgh, where the United States will manufacture guns from the steel ingots up to the finished weapon. The large program for shells and ammunition also includes developed facilities all over the country, including nitrate plants, powder plants, acid and chemical plants, and plants for recovering toluol from manufactured gas, from California petroleum and from the by-products of coke ovens. The program for the manufacture of powder and explosives is designed to make the United States independent of all foreign supply.

"The bill also provides for eight permanent anti-aircraft coast defense stations to be located at the discretion of the War Department. Here are some of the larger items in the bill: Purchase, manufacture and equipment of mountain, field and siege cannon, $500,000,000; ammunition for these cannon, $2,000,000,000; alteration and maintenance, $200,000,000; aviation, $8,000,000; subcaliber guns, ammunition for, $84,600,000; ammunition for seacoast cannon, $5,585,000; Panama Canal, $1,527,900; contract authorizations for mountain, field and siege cannon, $729,731,295; ammunition for these cannon, $1,793,734,550; alteration and maintenance, $100,000,000."

New Steel Hoop Plant for Chicago District

James E. MacMurray, president Acme Steel Goods Co., Twenty-eighth and Archer streets, Chicago, has purchased about 131 acres at 130th Street and Calumet River, on which will be constructed a steel hoop rolling mill at a cost of $1,000,000. Preliminary work has been started, and it is expected that work on the mill buildings will be started in about two weeks. The mill is to be constructed under the supervision of the Morgan Construction Co., Worcester, Mass. The output of the mill will be hoop steel for fastening bales, boxes and cases for which there is a large demand for Government shipments. The plant is for the manufacture of the raw material, the finishing being done in the company's present works.

It is reported that 1500 machinists, employed at the B. F. Sturtevant Co., Hyde Park, Mass., will go on strike unless their request for the same wage rates as now are paid to the shipyard mechanics is granted. The company has heavy Government contracts.

PERSONAL

Arthur A. Clement, president American Wire Fence Co., Libertyville, Ill., has also been elected vice-president of the Page Steel & Wire Co., whose mills are at Monessen, Pa., and Adrian, Mich. He will continue his headquarters at the office of the American Wire Fence Co. in Chicago.

James L. Wick has been appointed special agent of the Youngstown Sheet & Tube Co., Youngstown, Ohio, effective July 1, succeeding Roy Welch, recently made assistant to President James A. Campbell.

Harold Davey, superintendent of the hot mills, and F. Austin Davey, chief engineer of the Mansfield Sheet & Tin Plate Co., Mansfield, Ohio, have entered Government service, and have been detailed to Detroit for inspection of steel.

Kenneth D. Myers, advertising manager of the Sharon Steel Hoop Co., Sharon, Pa., has entered the Naval aviation flying corps.

Frank H. McMasters, formerly chief clerk at the Shenango Works of the American Sheet & Tin Plate Co. at New Castle, Pa., has been appointed chief clerk of the ordnance department of the United States Steel Corporation, and after July 1 will be at Neville Island. William E. Baer, formerly of New York, has been appointed Government auditor in connection with the Neville Island plant. Fred Hubbard, construction superintendent and efficiency engineer of the Carnegie Steel Co., in the Youngstown, Ohio, district since June 1, and previous to that time chief civil engineer, has been named chief civil engineer of the Neville Island plant. He was in charge of the civil engineering of the McDonald mills, and town site projects. Lloyd M. Applegate has been appointed to succeed Mr. Hubbard as district civil engineer of the Carnegie company at Youngstown.

Ralph A. Walters, assistant superintendent of the American Bridge Co., has been appointed superintendent of steel construction and installation of machinery at the plant at Neville Island. Mr. Walters graduated from the Worcester Polytechnic Institute, Worcester, Mass., in 1906 and has been connected with the American Bridge Co. since that time.

Frederick W. Heiser has resigned as assistant superintendent of the Zanesville Malleable Foundry Co., Zanesville, Ohio, to become superintendent of the Canton, Ohio, malleable foundry of the Timken-Detroit Axle Co.

Promotions effective at the Bethlehem, Pa., plant of the Bethlehem Steel Corporation last week were as follows: J. W. Grace, appointed assistant general superintendent of plant; W. J. Wysor appointed superintendent of the service department succeeding J. W. Grace; Charles L. T. Edwards appointed superintendent of the blast furnaces, succeeding W. J. Wysor; George M. Hohl, appointed assistant superintendent of the blast furnaces, succeeding Mr. Edwards. H. S. Vance was appointed production engineer.

C. H. Overkamp, Pacific Coast, manager for Manning, Maxwell & Moore, Inc., is visiting the company's offices in New York.

Henry W. Hand, for the past year president of the William Cramp & Sons Ship & Engine Building Co., Philadelphia, resigned recently, and has been succeeded by J. Harry Mull. Mr. Mull is one of the veterans of the Cramp company, having entered into service in 1880, subsequently becoming general superintendent, later manager of the marine department and on June 1 vice-president and general manager. Mr. Hand resigned because he wished to be relieved of the arduous duties of his position. He had been appointed to the presidency on May 31, 1917.

J. H. Harvey, Milwaukee, has been appointed manager of the Ohio Steel Foundry Co., Springfield, Ohio, succeeding W. J. Nugent, who has resigned to become identified with the Electric Steel Co., Chicago.

At the annual banquet of the Detroit Foundrymen's Association, the following officers were elected for the season 1918-1919: E. I. Chase, Cadillac Motor Car Co., president; B. W. Pike, Detroit Steel Castings Co., vice-president; H. J. Barton, Packard Motor Car Co., secretary; Col. J. R. Stewart, General Aluminum & Brass Mfg. Co., treasurer. Members of the Executive Board were elected as follows: A. B. Machon, Aluminum Castings Co.; R. G. Rousch, Cadillac Motor Car Co.; R. Crawford, Atlas Foundry Co.; F. Erb, Packard Motor Car Co., and F. W. Christian, Acme Foundry Co.

A. M. Minnick who, for the past two years has been sales manager of the electric-furnace department of the John A. Crowley Co., Detroit, manufacturer of the Grönwall-Dixon electric melting and refining furnace, has been appointed a first lieutenant in the Ordnance Department of the U. S. Army. Mr. Minnick, prior to his connection with the John A. Crowley Co., was sales manager of the Snyder Electric Furnace Co., Chicago.

Herman H. Westinghouse, chairman Westinghouse Air Brake Co., has been elected a director of the Westinghouse Electric & Mfg. Co. to succeed J. N. Wallace.

J. R. McWane, founder and president of the American Cast Iron Pipe Co., Birmingham, has been appointed chief of the operating standardization staff of the Emergency Fleet Corporation and has gone to Philadelphia to assume his duties.

C. C. Hanch, treasurer and director of the Studebaker Corporation for the past three years and secretary of the National Automobile Chamber of Commerce, has been appointed chief of the automotive products section of the War Industries Board to succeed H. L. Horning who has resigned.

Dr. Chas. W. Burrows, associate physicist of the Bureau of Standards, in charge of the magnetic section of that institution, has resigned and will take up the work of commercial research and consultation, with laboratories equipped for research on problems involving magnetic materials and apparatus located at Grasmere, Borough of Richmond, New York. The magnetic analysis of steel and steel products with a view to the determination of homogeneity and uniformity of output, as determined by mechanical and thermal treatment, will be one branch of the work carried on.

William W. Coleman, president Bucyrus Co., South Milwaukee, Wis., has accepted an appointment from Maj.-Gen. C. C. Williams, acting chief of ordnance, U. S. A., to aid a group of expert advisers of the Ordnance Department in bringing the manufacture of guns, carriages and munitions to the highest rate of production possible.

Harry L. Horning, Waukesha, Wis., who resigned June 1 as chairman of the automotive products section, War Industries Board, after more than a year's service to the Government, has returned to Waukesha to resume the active management of the Waukesha Motor Co., of which he is vice-president and general manager. The growth of the company's business and expansion necessary to handle increasing Government and commercial contracts for motor truck engines made it necessary for Mr. Horning to relinquish his Government connection.

The Edison Storage Battery Co. has established a sales office in Kansas City, Mo., appointing Benjamin F. Eyer as resident manager. Mr. Eyer was head for 11 years of the electrical engineering department of the Kansas State Agricultural College and in 1916 he opened an office in Kansas City as consulting engineer.

Walter E. Bush, 109 Highland Avenue, Jersey City, N. J., has been appointed United States buyer for a large importing corporation in Australia.

Ellsworth L. Mills has been appointed sales manager of the railroad department and apparatus department of the Air Reduction Sales Co., with headquarters at 120 Broadway, N. Y.

E. Francis McCrossin has withdrawn from the firm of McCrossin & Darrah, representatives of the Link-Belt Co. in Alabama, to devote his time to engineering work. John F. Darrah, previously joint representative

with Mr. McCrossin, will represent the Link-Belt Co. singly.

Walter W. Nowak, special representative of the Niles-Bement-Pond Co., 111 Broadway, New York, who has been appointed manager of its London office, 25 Victoria Street, S. W., succeeding W. S. Accles, deceased, sails this week to assume his new duties. He represented the company in Chile a few years ago at the time it was awarded the $20,000 prize by the Chilean Ministry of Railways for the best plans for railroad equipment repair shops for the state railroads.

A. B. Cole has been appointed assistant to J. C. McQuiston, manager department of publicity, Westinghouse Electric & Mfg. Co., East Pittsburgh, to succeed M. C. Turpin, who has accepted a position in the Ordnance Department at Washington, D. C. Mr. Cole will have charge of the editorial work, including the preparation of literature and supplying information to the press. He started his career as general car-shop laborer for the Grand Rapids, Grand Haven & Muskegon Railroad at Fruitport, Mich., with the idea of obtaining a first-hand working knowledge of electric railway operation. In June, 1909, he graduated from the School of Electrical Engineering, Purdue University, Lafayette, Ind., where he made a specialty of steam and electric railway studies. On July 15, 1909, he entered the engineering apprenticeship course of the Westinghouse Electric & Mfg. Co. Recently he has been co-operating on publicity matters, with the American Electric Railway Association War Board at Washington, D. C., spending half his time in Washington, and the remainder in East Pittsburgh. The Westinghouse company a few months ago delegated Mr. Cole to make a general freight survey of a large number of the electric railways of Indiana, Ohio, Michigan, Illinois, Wisconsin and Iowa, to determine what possibilities existed for a more extensive use of transportation facilities for hauling freight and relieving the steam road congestion.

Lieut. Heath E. Noble, formerly of the New York office of Rogers, Brown & Co., who has been in active service in France with the Rainbow Division, has been promoted to first lieutenant of Company I, 168th Infantry, on recovering from a wound which confined him for some time to a hospital. He was a graduate of the first Plattsburg training camp of 1917, and at that time received a commission as second lieutenant.

For Increase of Fuel Oil Storage

The Oil Division of the Fuel Administration is urging manufacturing firms operating on fuel oil to fill their avalaible storage now and if possible to create a reserve storage which can be used next winter. This, it is explained, is not to be taken to mean that all industries can be insured fuel oil deliveries by ordering now, though the various subcommittees will do their utmost to see that essential industries seeking to secure fuel oil for next winter's consumption are taken care of. Many cases are cited of industrial plants operating with oil storage of only 10 days' capacity. Such plants are urged to install storage that will give a greater margin of safety. C. G. Sheffield, assistant to Director Requa, head of the Oil Division, says that 30 days' storage should be a minimum and preferably there should be storage to carry 60 days' supply of fuel oil. The oil industry, in securing an express movement of tank cars with the aid of the railroads, is now getting exceptionally good service. Tank cars are moving as high as 300 miles a day, as compared with the general average of less than 30 miles last winter. The fuel oil stocks are normal and perhaps better than those at the refineries. These conditions are favorable for the delivery of fuel oil during the summer months.

The Lyons Atlas Co., Indianapolis, manufacturer of Diesel engines, and the Hill Pump Co., Anderson, Ind., maker of turbines and pumps, have been merged under the name of the Midwest Engine Co., capital $3,500,000. The new company will spend $1,000,000 in extensions and equipment, having large Government contracts.

Lake Superior Ore Advanced 45 Cents

(*Continued from page* 1687)

leged needs of the Government shall feel the responsibility devolving upon them to limit their requisitions to actual requirements.

There is no purpose on Mr. Baruch's part to curtail supplies of steel for actual war needs. With reference to the shipbuilding program, for example, he has expressed the opinion that the steel shipyards should have all the material they need and a sufficient quantity to provide reasonable reserves, and especially such "banks" of plates as will enable the yards building fabricated ships to push construction with all possible speed. At the same time, Mr. Schwab and his lieutenants will be urged to keep in mind the scarcity of plates, and not to accumulate unnecessary stocks.

The War Industries Board is giving all possible assurances to representatives of industries consuming steel that, although the supply available for non-war purposes promises to be very small, every effort will be made so to utilize it as to impose a minimum of hardship on all legitimate interests. Mr. Baruch desires it understood that the board will give close attention to the needs of every industry, and will consider none too small to justify a detailed survey before its steel supply is cut off.

Strike at Bridgeport Ordnance Plant

About 400 machinists employed by the American & British Mfg. Co., Bridgeport, Conn., went on strike June 24 to enforce a demand that the standard wage rates awarded by the Labor Adjustment Board, Ordnance Department, be made effective at once. The Ordnance Department has not recognized the American & British Mfg. Co. as a party to the wage adjustment and the manufacturers who are recognized parties to the award have not accepted the decision.

The leaders of the machinists' union threatened a general strike June 26 if the employers of machinists in Bridgeport did not accept the decision and make the rates effective by noon of June 27. Late on June 24, Waldo C. Bryant, ordnance chief, Bridgeport district, received from Gen. C. C. Williams, acting chief of ordnance, a telegram of which the following is a part:

"In view of vital consequences of any action taken it seems to me advisable to withhold making this award effective until opportunity shall have been given for a thorough review of its provisions and I therefore direct that the award be withheld. I am therefore referring the whole matter to the War Labor Board established by the President for such contingencies and I confidently expect early consideration by this board of the readjustment desirable to be made."

The Bridgeport Labor Wage Award

WASHINGTON, June 25.—Upon receipt of a telegram from Recording Secretary Smith of the Bridgeport, Conn., local union of the International Association of Machinists to the effect that the machinists, at a meeting to be held to-morrow, will vote to strike because the manufacturers refuse to accept an award recently made in favor of the men, Secretary of War Baker has wired that he has taken up the controversy with the War Labor Board. "The matter," he says, "is therefore being submitted to the highest authority and one in which you must have especial confidence due to the able representation thereon of the organized machinists. Pending decision I feel that the War Department has a right to expect full co-operation of all interests, whether of labor or management, in Bridgeport that no partisan strike shall delay production of war necessities."

No. 3 blast furnace of the Brooke Iron Co., at Birdsboro, Pa., was put into blast this week after undergoing extensive repairs.

Machinery Markets and News of the Works

BUYING FOR ORDNANCE

Expansion in Gun and Shell Plants

Bridgeport Gun Plant to Get New Equipment—Two New Shell Plants Buy

The Watertown Arsenal, Watertown, Mass., is in the market for equipment for a gun-carriage shop. The Bullard Engineering Works, Bridgeport, Conn., will buy additional equipment for its gun plant. Equipment has been bought for two large shell plants in the Chicago district, that of the Symington Machine Corporation, heretofore referred to, and the American Steel & Machinery Co., Pullman, Ill.

Tools for the Symington plant were bought in the East and those for the American Steel & Machinery Co. were bought at Bucyrus, Ohio, from the office of the parent company, the American Clay Machinery Co.

The Wright-Martin Aircraft Corporation is expected to come into the market within a week for the purchase of about $1,500,000 worth of new equipment for its Long Island City, N. Y., plant. This plant will be equipped for a capacity of 50 motors per day.

The Bethlehem Shipbuilding Corporation, Bethlehem, Pa., is placing orders for more than 100 machines for a plate and angle shop at its new Liberty shipyard at Alameda, Cal. Contracts will be closed this week for about 100 cranes. A machine-tool list is expected shortly.

While there are a number of big projects before the machine-tool trade, business as a whole, particularly in the small and medium sized tools, is somewhat dull, according to the war-time standards which have been established. Many builders of tools are complaining of a scarcity of orders. A scarcity of machinists is a limiting factor in plant enlargements.

New York

NEW YORK, June 25.

The Watertown Arsenal, Watertown, Mass., is again in the market for a large quantity of equipment. It is inquiring for tools for its motor carriage department, which will make mobile gun carriages.

The Bethlehem Shipbuilding Corporation, Bethlehem, Pa., is buying on its list of fabricating shop equipment. A revised list includes 10 double plate punches, 20 Lysholm plate-punching table, 12 single-bracket plate punches, 12 vertical angle punches, five horizontal angle punches, two gate shears, 10 splitting shears, three double-head angle shears, three single-head angle shears, one combination manhole punch and limber hole punch and shear, one hydraulic joggling machine of 300-ton capacity, one bending brake, two hydraulic keel benders of 500-ton capacity, four plate planers, two plate scarphing machines, two bending rolls, two straightening rolls, two friction saws, three radial drills, two horizontal drills, nine radial-arm countersinking machines, two angle plate planers, two angle bar furnaces, two angle beveling machines, two liner rolls, one 250 lb. Nazel hammer, 20 two-wheeled grinders and four bull riveters.

It is expected that the Wright-Martin Aircraft Corporation will come into the market within a week for the necessary equipment for its Long Island City plant, recently acquired. It is understood that its purchases will total about $1,500,000.

The Worthington Pump & Machinery Corporation is buying tools for its Buffalo plant. The International Arms & Fuze Corporation, Bloomfield, N. J., has bought several new tools.

Inquiries for machine tools during the past week have fallen off. A majority of builders are doing a fair business in small lots, but some are complaining of a scarcity of orders.

Crane builders have been anxiously awaiting the letting of orders by the Bethlehem Shipbuilding Corporation for about 100 cranes for its new shipyard at Alameda, Cal. It is reported that the orders may be let some time this week. The New York Shipbuilding Corporation, Camden, N. J., has issued a supplementary list of 14 cranes as follows: One double-trolley crane, with 20-ton trolleys, 103 ft. span; eight single-trolley cranes, with 15-ton trolleys, 50 ft. span; two 15-ton, 42 ft. span; two 5-ton, 42 ft. span; one 15-ton, 58 ft. span. The American Car & Foundry Co., New York, has not yet closed for six 5 and 10-ton cranes. The Braden Copper Co., New York, wants four monorail hoists with grab buckets. The Nichols Copper Co., New York, wants several cranes. The Milwaukee Electric Crane & Mfg. Co., Milwaukee, has taken an order for seven cranes from the Vulcan Iron Works, Wilkes-Barre, Pa. The Northern Engineering Works, Detroit, has sold a 10-ton crane to Westinghouse Church Kerr & Co., New York, for the Michigan Copper & Brass Co., Detroit; a 10-ton crane to the Vulcan Iron Works, Jersey City, N. J.; a 20-ton crane to the General Electric Co., Schenectady, N. Y., and a 5-ton crane to the General Electric Co., West Lynn, Mass. The Champion Engineering Co., Kenton, Ohio, has sold two 10-ton cranes to the General Electric Co., Schenectady, N. Y. The Pawling & Harnischfeger Co., Milwaukee, has sold two 5-ton and two 10-ton cranes to the United States Cast Iron Pipe & Foundry Co. for its Scottdale, Pa., works. The Pennsylvania Railroad Co. has revised its crane inquiry and now wants only two 100-ton cranes and one 10-ton, 3-motor crane. The 100-ton cranes are to be 6-motor and 87 ft. 9 in. span.

The Cleveland Crane & Engineering Co., Wickliffe, Ohio, has taken an order for three cranes for a new plant to be built by the Pratt Engineering Co., New York, at Atlanta, Ga. One of the cranes was 50-ton capacity, with 7½-ton auxiliary, 50-ft. span, and two were of 10-ton capacity, 30 ft. 7 in. span. The Atlas Crucible Steel Co., Dunkirk, N. Y., is in the market for a 25-ton crane, with 5-ton auxiliary, 65-ft. span.

The J. J. McCabe Punch & Shear Co., 149 Broadway, New York, has been organized by the owners of the J. J. McCabe Machinery Corporation. The punch and shear works is located at Chattanooga, Tenn. J. J. McCabe is president, H. P. McCabe, vice-president; P. F. Sheeran, treasurer; F. C. Kompass, secretary, and J. J. McCabe, Jr., is plant superintendent. M. Sherman is master mechanic.

The Rare Metal Products Co., 726 Bloomfield Avenue, Glen Ridge, N. J., has acquired the plant of the Seton Chemical Co., Cortland Street, Belleville, for about $150,000. The property consists of a main building 400 ft. long, with auxiliary structures aggregating 30,000 sq. ft. of floor space, with a site of 7½ acres. The company will use the works as an extension to its plant.

The George C. Moon Co., Garwood, N. J., manufacturer of wire rope, has awarded a contract for a new one-story brick plant, 80 x 200 ft., at Dunellen, N. J., to Salmond Brothers, 506 Elm Street, Arlington.

Fire, on June 19, destroyed the plant of the Armor Bronze Co., Garwood, N. J., manufacturer of ornamental bronze specialties, with an estimated loss of $20,000.

John Fochs, operating a foundry at Elgewater, N. J., has acquired the former plant of the Empire Foundry, Division Street, East Port Chester, N. Y., for $26,000, and will remove the entire works to the new location.

The American Shell Co., 250 Twenty-first Avenue, Paterson, N. J., has acquired property comprising 13 city lots on Thirty-sixth and Thirty-seventh streets, for extensions to its plant.

A new one-story brick and steel power house, 60 x 150 ft., will be erected by the New York Belting & Packing Co., Passaic, N. J.

Hector McIntyre, 355 Union Street, Jersey City, has had

plans prepared for a one-story brass foundry, 25 x 65 ft., at 877 Communipaw Avenue.

The Federal Shipbuilding Co., Kearny, N. J., is said to be planning the construction of a new drydock, about 1000 ft. in length, at its property recently acquired on the Hackensack River, between Yale and Communipaw avenues and the Newark & New York Railroad bridge in Jersey City.

The Henry R. Worthington Co., Harrison, N. J., manufacturer of pumps, etc., has acquired property adjoining its plant at Ann Street and Ogden Avenue, 65 x 225 ft.

E. & J. Bass, 610 Broadway, New York, manufacturers of silver-plated novelties, have acquired property, 30 x 125 ft., at 114 Commerce Street, Newark, and are planning a three-story plant.

The Standard Piston Ring Co., Newark, has been incorporated with a capital of $1,250,000 by N. M. Eisenberg and L. E. Dresser, New York, and M. Levy, Brooklyn.

The Meyer Scale & Hardware Co., 409 Elizabeth Avenue, Newark, has leased space in the manufacturing buildings at 312-28 Adams Street, and is planning the removal of its works to that location.

Thomas E. Gleeson, Inc., 415 John Street, East Newark, N. J., manufacturer of wire cloth and wire goods, is planning the reconstruction of its two-story factory recently destroyed by fire with loss of about $15,000. The new plant will be about 100 x 100 ft.

The John Trageser Steam Copper Works, 447 West Twenty-sixth Street, New York, manufacturer of galvanized boilers and copper specialties, has acquired the building at 459 West Twenty-sixth Street as an extension.

The Combustion Control Co., Inc., New York, has been incorporated with a capital of $100,000 to manufacture furnaces, boilers and appliances for the regulation of heat, etc. F. D. Potter, Linden, N. J.; W. B. Raymond, 106 Taylor Street, Brooklyn, and N. Hise, 64 East Eighty-sixth Street, New York, are the incorporators.

Pitz & Weber, operating a brass foundry at 458 East Tenth Street, New York, have increased their capital from $20,000 to $150,000.

The Beacon Tool & Supply Corporation, New York, has been incorporated with an active capital of $25,000 by A. Burrows, A. J. Cole, and E. L. Hearn, 149 Broadway.

The Standard Shipbuilding Co., 44 Whitehall Street, New York, has had plans prepared for additions to its shipbuilding plant at Shooters Island, Staten Island, to cost about $60,000.

The Briggs Engineering Co., Brooklyn, N. Y., has been incorporated with a capital of $50,000 by C. N. Wheeler, W. E. Yandell and J. S. Briggs, 404 Sixty-first Street, Brooklyn, to manufacture marine engines and parts.

The plant of the National Casket Co., Jackson Avenue, Long Island City, N. Y., has been taken over by the Government, and will be devoted to the production of munitions.

The Reliance Steel & Tool Co., 30 Church Street, New York, has leased space at 24-26 Murray Street to provide for extensions.

John F. Pitz, operating a pattern-making plant at 63 Park Row, New York, has increased his capital from $3,000 to $100,000.

The Boylan & Conroy Co., Geneva, N. Y., has been incorporated with a capital of $20,000 by C. R. Conroy, L. H. Burdick and W. L. Boylan, Hornell, to manufacture electrical specialties.

The Up-to-Date Harvester & Machine Co., Jordan, N. Y., has been incorporated with a capital of $100,000 to manufacture harvesting machines and other agricultural implements. E. R. Wilcox and O. and H. T. Allen, Jordan, are the incorporators.

Buffalo

BUFFALO, JUNE 24.

The Pennsylvania Railroad Co. has had plans prepared for an engine-house and other shop buildings to be constructed at its Gardenville yards at the junction of the Buffalo Terminal Railroad near Buffalo, at an estimated cost of $75,000. A. F. Whitney, Buffalo, is superintendent; A. C. Shand, Broad Street Station, Philadelphia, is chief engineer.

The Art Metal Construction Co., Jamestown, N. Y., has had plans drawn for a boiler-house extension.

The Essex Foundry Co., Newark, N. Y., is taking bids covering the erection of a core-oven building at its plant on Murray Street.

The Automatic Transportation Co., Buffalo, is receiving bids for a three-story steel and concrete addition 75 x 100 ft. to be made to its plant at Main Street and the Erie Railroad.

The International Paper Co., Watertown, N. Y., A. H. White, chief engineer, 30 Broad Street, New York, has plans in preparation for rebuilding its sulphite factory at Watertown.

The Pullman Co., Marine Bank Building, Buffalo, has had plans prepared for a new power house addition to its works at 1770 Broadway, estimated to cost $27,500.

The Buffalo Bronze Die Cast Corporation, Buffalo, has been incorporated with a capital of $5,000 by N. W. Meloon, T. W. H. Jeacock and A. Kendall.

The Kellogg Structural Steel Co., 31 Stone Street, Buffalo, has increased its capital from $50,000 to $100,000.

The Falls Equipment Co., Niagara Falls, N. Y., has been incorporated with a capital of $100,000 to manufacture electrical, heating and lighting equipment. J. C. Jones, R. D. Glennie and F. W. Korff, Lockport, are the incorporators.

The Buffalo Marine Construction Corporation, Buffalo, has been incorporated with a capital of $275,000 by R. E. Powers, F. W. Allen and E. Gaskin.

The Turbine Engineering Corporation, Buffalo, has been incorporated with a capital of $100,000 by C. J. Bush, J. A. Carmon, and A. L. Vickery, Exeter Terrace, Buffalo, to manufacture turbines, engines, etc.

The Bridgeford Tool & Machine Works, Rochester, N. Y., is planning the construction of a new power house at its plant on Winton Road.

The Seneca Falls Mfg. Co., Bridge and Water streets, Seneca Falls, N. Y., manufacturer of wood-working and leather machinery, has had plans prepared for brick and steel extensions estimated to cost $40,000 to provide increased capacity. Elliott Kiffey is president.

New England

BOSTON, JUNE 24.

While there is little plant expansion now going on in New England, there is a very heavy pressure for larger production from existing plants. A steady stream of orders for machine tools is coming into this territory from all parts of the country, and the scarcity of machinists is becoming accentuated every day. There is considerable labor unrest, but it is not believed that existing strikes and threatened strikes of considerable magnitude will be long allowed to interrupt the Government program of war production.

The announcement that the War Labor Policies Board will undertake to set standard wage rates for the entire country in the machine shops and that manufacturers and employees are asked to refrain from wage controversies until this board has opportunity to present its report will, it is believed, have a great effect on the present labor unrest.

The Bullard Engineering Works, Bridgeport, Conn., operating a plant for machining field artillery, is in the market for a large list of equipment, as it has been notified by the War Department that its present contract will be greatly increased.

The Lake Torpedo Boat Co., Bridgeport, Conn., is understood to have under way plans for an extension which will make it the largest plant in the world devoted exclusively to the construction of submarines. The company has recently been given another large contract by the Government. It now employs about 2000 men, and it is understood that with the increased capacity about 5000 will be needed. The company has awarded to the Casper Ranger Construction Co., Holyoke, Mass., a contract for an addition, 40 x 80 ft. and 24 x 24 ft., one story.

The Miller Metalwork Co., Southington, Conn., has been incorporated with authorized capital stock of $100,000 to manufacture castings, sheet and plate metal work, pipes, etc. It will commence business with capital of $50,000. John H. Bradnack is president and Edmund L. Curtis, vice-president and treasurer.

The R. Wallace & Sons Mfg. Co., Wallingford, Conn., has has increased its capital stock from $116,400 to $1,600,000.

The Victory Equipment Corporation, Boston, has been incorporated with authorized capital stock of $80,000 to manufacture valves, pipe fittings, tools, etc. W. M. Robinson is president and Harold W. Krogman, 189 Babcock Street, Brookline, treasurer.

The Milliken Machine Co., Newton, Mass., has been incorporated with authorized capital stock of $25,000 to conduct a general machine shop. Charles H. Milliken, 25 Prospect Place, West Newton, is president and treasurer. M. C. Milliken and W. H. Brockway are other directors.

The Bridgeport Axle Co., Bridgeport, Conn., has been in-

corporated with authorized capital stock of $50,000 to manufacture automobile axles, mufflers, etc. It will begin business with capital of $5,000. The incorporators are Samuel D. Polsen, Francis M. Volpe and William D. Sherwood.

Philadelphia

PHILADELPHIA, JUNE 24.

The Niles-Bement-Pond Co., Twenty-first and Callowhill streets, Philadelphia, has awarded contract to the Austin Co., Bulletin Building, Philadelphia, for a one-story foundry addition to its plant at Ruffner and Donath streets, 65 x 115 ft., to cost $20,000.

The Sterling Engineering Co., Philadelphia, has been incorporated with a capital of $50,000 to manufacture machinery. F. A. Moorshead is the principal incorporator.

S. D. Allen & Co., Inc., Philadelphia, has been incorporated with a capital of $10,000 to manufacture machinery. Edward J. Ritchie is the principal incorporator.

J. Gilroy, Philadelphia, and associates, have incorporated under Delaware laws the Cardinal Tool Co., with a capital of $100,000 to manufacture tools, etc.

The New York Shipbuilding Corporation, Camden, N. J., has commenced the construction of its proposed new forge shop, 70 x 105 ft., and a two-story addition to its plate shop, 95 x 160 ft.

The E. T. Lippert Saw Co., 608 Lincoln Avenue, Millvale, Pa., has taken bids for a three-story and basement machine-shop addition, 35 x 145 ft., to cost $40,000.

The Montgomery Foundry & Mfg. Co., Pottstown, Pa., has been incorporated with a capital of $100,000 by J. F. Sevison and others.

Extensive additions and improvements will be made to the shops of the New York Central Railroad Co., near Jersey Shore, Pa., including the construction of new car shops of increased capacity, new machine and blacksmith shops, a power plant, etc. An appropriation of $800,000 has been made by the Railroad Administration to cover the work.

Pusey & Jones, Gloucester City, N. J., have awarded contract to the Lewis & Roth Co., Broad and Chestnut streets, Philadelphia, for the erection of its new power plant for the operation of its two shipbuilding plants. The structure will cost $596,780.

The General Textile Machinery Co. of Yardley, Pa., has purchased the plant of the Wharton Switch Works, Jenkintown, Pa., and will occupy it shortly.

The Bureau of Yards and Docks, Washington, D. C., is taking bids for two one and two-story ammunition buildings, 30 x 160 ft., and 30 x 145 ft., at Fort Mifflin, near Philadelphia.

Baltimore

BALTIMORE, JUNE 24.

Bloxom Brothers, Battery Park, Va., have been incorporated with $50,000 capital stock to build wooden ships. O. A. Bloxom is president.

Fire, June 20, did considerable damage at the plant of the Alexander Milburn Co., 1420-1428 West Baltimore Street, Baltimore, manufacturer of acetylene appliances.

The Richmond Smith-Form-A-Truck Co., 1813 West Broad Street, Richmond, Va., will install equipment to build trucks from used cars, and is seeking prices on lathes, electric drills, welding outfits, etc. Dallas D. Armstrong is manager.

The City Commissioners, City Hall, Raleigh, N. C., are receiving bids on equipment for a waterworks plant, including a 4,000,000-gal. motor-driven centrifugal pump and a 5,000,000-gal. turbine-driven centrifugal pump.

Fire recently destroyed the foundry of Briggs, Shaffner & Co., Winston-Salem, N. C. It will be rebuilt.

Slaysman & Co., Pratt and President streets, Baltimore, have awarded contract to John A. Kelly, 1208 East Biddle Street, for a three-story machine-shop addition at 807 East Pratt Street, 50 x 70 ft., to cost $10,000.

The Bowen Anchor Co., Washington, has filed notice of a change in its corporate name to the Morton Steel Casting Co.

The Crisfield Shipbuilding Co., Crisfield, Md., has been incorporated with $80,000 capital stock by James B. Taws, John B. Robins and Charles P. Lankford.

The Southern Truck & Car Corporation, Greensboro, N. C., organized with a capitalization of $1,000,000, will manufacture 1-ton motor trucks and all parts except engines. A 7-acre site has been acquired, and the first building will be one-story, 60 x 200 ft.

The Tozer Engine Co., Columbia, S. C., recently incorporated with a capital of $50,000, has perfected its organization, and is planning a plant for the manufacture of steam engines, boilers and general foundry equipment. T. F. Dial is president and manager; J. P. Matthews, vice-president, and George L. Dial, secretary.

The Ingalls Iron Works, Avenue D and Seventh Street, Birmingham, Ala., is planning an addition to its plant to cost about $9,500.

The Jones & Hernandez Machine & Foundry Co., Birmingham, Ala., is planning a foundry to cost about $15,000.

Chicago

CHICAGO, JUNE 24.

Disappointment is felt by not a few members of the machinery trade over the fact that the promoters of two large shell enterprises chose to place their orders for machine tools in cities other than Chicago, despite the fact that delivery is to be in or near this city. The Symington interests appear to have done this, as did also the American Steel & Machinery Co., Pullman, a subsidiary of the American Clay Machinery Co., Bucyrus, Ohio. The latter company did most of its buying at Bucyrus. In both cases interests foreign to Chicago, so far as their plants are concerned, are the purchasers, and it is not surprising that they should place their business through channels with which they are familiar.

The American Steel & Machinery Co. is equipping a gigantic plant to turn out 6000 155-mm. shells per day.

Despite the impending restriction of general manufacture, the miscellaneous demand for machine tools of the smaller sizes continues good, while large ones can be sold as fast as they can be located. Dealers realize that with tools used in munitions making it will be some time before they will be able to keep any stock on their floors, or, for that matter, get any machines for stock at all. The result is that they are selling deliveries quite as much as machines. When a prospective purchaser finds he cannot get the specific machine he wants within the time he would like to have it, he shops around until he finds some other machine possessing a better delivery which will answer his purposes.

According to latest reports it is understood that the Symington interests are to manufacture 6000 155-mm. or 6-in. shells per day in Chicago at a plant whose location has not yet been announced; also that the company is having shell-making machinery of its own design made by the Reed-Prentice Co., Worcester, Mass.

A permit has been granted to the Henry Pratt Co., 2222 South Halsted Street, Chicago, for the erection of a one-story machine shop, 50 x 123 ft.

General building operations are showing a little betterment in Chicago, but factory construction is at low ebb. The Oscar Heineman Co., manufacturer of silk thread, 2701 Armitage Avenue, Chicago, has awarded the contract for a four-story factory, 125 x 125 ft. at 1935 to 1945 North Fairfield Avenue. It will be of reinforced concrete construction.

The Viking Pump Co., Cedar Falls, Iowa, has recently awarded a contract to Merrill Brothers for the erection of a new one and one-half story plant to cost $20,000.

The Climax Tractor Co., Chicago, has been incorporated in Delaware with a capital of $100,000 to manufacture tractors and machinery. Ransom E. Walker, H. S. Mustin and R. L. McKean, Chicago, are the incorporators.

The Lake Shore Tinning Co., Chicago, has filed notice of a change in its corporate name to the Great Lakes Metal Mfg. Co.

The Productometer Co., Chicago, has been incorporated in Delaware with a capital of $250,000 to manufacture recording machines. John C. Draper and Peter A. Cooney, Chicago, are the incorporators.

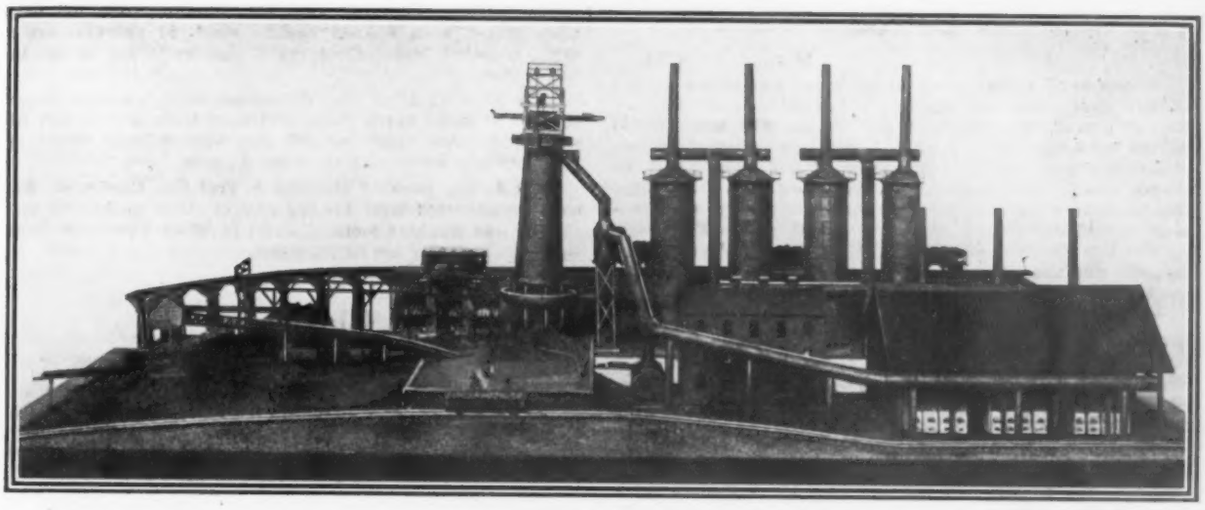
Milwaukee

MILWAUKEE, JUNE 24.

The demand for machine-tools continues active, and while it favors the heavier types, light machines are moving at a satisfactory rate. Requirements show a wide range of purpose and urgency of delivery. Manufacturers of milling machines report that new business of considerable proportions is booked daily, although the heavy requirements to be placed by the Government are still in prospect.

The recognition of Wisconsin and other Middle Western metal-working industries in the distribution of Government war work to a greater extent than previously, is expected to furnish an enormous demand for machine-tools, judging from inquiries received by local tool builders the past week.

The Hercules Steel Casting Co., 500 Free Press Building, Milwaukee, organized some time ago by local interests and incorporated with a capital stock of $300,000, has perfected



Model of a Blast Furnace Plant at the Commercial Museum, Philadelphia, Constructed by the Curator of the Museum Entirely from Photographs Made at Various Times

its organization and will begin work immediately on the erection of an electric steel foundry in Bay View. It has acquired the plant of the Crown Metal Co., 871-889 Robinson Avenue, and will raze the buildings to make room for a brick, steel and concrete foundry, 90 x 350 ft., to contain a 5-ton electric furnace, already contracted for. Ground will be broken some time this week and operations are expected to begin by Sept. 1 or 15. The officers are: President, Joseph Ewens; vice-president, Dr. J. J. McGovern; secretary-treasurer, E. B. Gennrich.

The Waukesha Motor Co., Waukesha, Wis., manufacturer of automobile and motor truck engines, is increasing its floor space 25,000 to 30,000 sq. ft. by the erection of three shop additions. The new facilities are required to handle Government contracs for military truck motors and a demand for power units from commercial motor truck manufacturers. The additions will be ready shortly after July 1. Harry L. Horning, vice-president and general manager, has resumed active direction of the business after devoting more than a year as chairman of the automotive products section, War Industries Board, Washington.

The United States Switch Co., Eau Claire, Wis., manufacturing automatic switches and signals, has acquired 18 acres adjoining its plant and proposes to erect an electric steel foundry, 100 x 100 ft., and a new machine-shop, 100 x 200 ft., contingent upon the award of contracts by the Railroad Administration. The company has just completed an addition to its steel foundry and enlarged its machine-shop 50 to 75 per cent. J. W. Hubbard is president and general manager.

J. M. Boyd, 387 East Second Street, Fond due Lac, Wis., has taken over the plant and equipment of the former Fond du Lac Organ Blower Co., and will establish a factory for the manufacture of farm appliances, upon which he owns patents, and which have been manufactured by the Stowell Co., South Milwaukee, Wis. Mr. Boyd has acquired the machinery, equipment and other interests of the Stowell Co. in the hay tool business. He is purchasing some additional equipment for the new plant.

The Atlas Foundry Co., Milwaukee, which purchased an idle shop building at Thirty-ninth Avenue and Burnham Street, West Milwaukee, last fall and opened a gray-iron foundry, has purchased a site in West Allis and will build a new foundry costing about $50,000. The present shop will be acquired by a new interest which will continue it as a gray-iron foundry. The Atlas company is owned by W. E. Gerlinger and O. A. Mayer, and its present facilities are entirely inadequate to handle its business.

The Automatic Cradle Co., Stevens Point, Wis., will erect a new steam generating plant to develop power to the limit of the fuel supply obtained from the wood waste and refuse of the wood-working plant erected a year ago. The power house will be 43 x 63 ft., equipped with one new 150-hp. boiler and a 250-kw. generator unit, and will cost about $15,000 complete. J. J. Bukolt is president and general manager.

The Acme Motor Parts Corporation, Milwaukee, has been incorporated with a capital stock of $25,000 to manufacture automobile, truck, tractor and aviation engine parts and accessories. William S. Smulski, president and manager of the Sterling Metal Parts Co., Eighth and Oklahoma avenues, is the moving spirit in the new enterprise. William P. Doucette and Joseph Mietus are associated with him.

The W. H. Hobbs Supply Co., Eau Claire, Wis., manufacturer of plumbers' materials and supplies, has started work on a new plant and warehouse, five stories and basement, 40 x 125 ft., at South Farwell and Eau Claire streets. The project involves an expenditure of about $50,000.

The Jorgenson Mfg. Co., Waupaca, Wis., manufacturer of gas engine primers and other devices, has booked orders from motor truck manufacturers which will require extensive enlargements. The company is buying 10 to 12 automatic screw machines, lathes, etc., and some new equipment for its brass foundry. It is filling Government contracts for automobile parts and accessories for military vehicles. C. H. Jorgenson is general manager.

The Crude Oil Gas Burner Co., Milwaukee, has changed its name to the Crude Oil Gas System Co.

The board of education, Menasha, Wis., has awarded contracts for the erection of a two-story addition, 30 x 60 ft., to the high school to provide additional manual training facilities. Light metal-working and other equipment is being purchased.

The Leathem & Smith Co., Sturgeon Bay, Wis., shipbuilder and repairer, is making arrangements to enlarge its plant to handle a Government contract for six tugs. Details have not yet been prepared, but two additional berths are contemplated, with corresponding enlargement of the metal and wood-working shops.

The board of education, Bessemer, Mich., will take bids after July 1 for the construction of a new public school, 170 x 210 ft., two stories and basement, with an auditorium, manual training and domestic science facilities and power plant, to cost $125,000. John D. Chubb, 109 North Dearborn Street, Chicago, is the architect.

The Winther Motor Truck Co., Kenosha, Wis., is taking bids until July 1 for the erection of its new plant, 125 x 300 ft., of brick and steel, part two stories and basement. The company will invest approximately $125,000 in building and equipment, now being purchased. The machinery and tools in the plant at Winthrop Harbor, Ill., will be transferred to the new works when completed. Martin P. Winther is president and general manager.

It is officially confirmed that the General Motors Corporation, Detroit and New York, will establish a farm tractor plant at Janesville, Wis. While no figures are divulged, it is estimated that the investment, including equipment, will exceed $125,000. H. C. Allen, construction engineer, is preparing for the erection of the first buildings, consisting of machine-shop and assembling floor. Later the company will add a complete gray-iron foundry and electric steel casting shop. J. A. Craig is general manager.

The DePere Mfg. Co., DePere, Wis., is installing a new duplex air compressor system and a 150-hp. motor, together with four smaller motors. It is purchasing equipment for its new structural, plate and machine-shop addition, two large radial drills having been contracted for. Much of the capacity is occupied by Government contracts for 75 200-hp. marine boilers.

Detroit

DETROIT, JUNE 24.

Shortage of skilled labor is the main depressing feature of the local industrial situation. The Employers' Association of Detroit has estimated that in the city alone 40,000 skilled workmen are lacking. A measure of relief to this situation will result from the order of the Government allowing drafted skilled mechanics to return from the camps. Construction work is opening up and this month will see a total of building greater than any month of the past year. No relief in the coal situation is in sight, and industries are already anxious about their next winter's supply. Just enough coal is coming into Michigan for daily use.

The Ford Motor Co., Detroit, now has 72,000 men practically all engaged on war work, 32,000 in the Highland Park plant manufacturing trucks, motors, helmets, airplane engines, gun caissons and light tanks, and 25,000 at the shipbuilding plant. Over 15,000 men are employed at the blast furnace plant.

The foundry department of the Adolph Iron Works, Grand Rapids, Mich., which has two cupolas and a 10-ton daily capacity, will be sold and the site used for a modern brick structure to serve as a warehouse for the jobbing department. Adolph Leitel built the foundry in 1862, since when seven other units have been erected, until now the plant occupies an area 200 x 350 ft. Its large business in the manufacture of iron and steel machinery, elevators and heating supplies, sprang up from the foundry project. It is understood that arrangements will be made whereby the purchaser of the foundry will make the castings for the company's other departments.

The Port Huron Foundation Co., Port Huron, Mich., is reported about to close an order to construct five 280-ft. revenue cutters for the United States Government. It also has a contract for ten 250-ft. trawlers for the French Government, and it is proposed to lay the keels for all 15 boats at once. The company has secured permission of the Navy Department to construct bulkheads in the St. Clair River to fill in some land, giving more room for laying of keels. In addition to this improvement, which will cost $600,000, new mill and other shops to cost $200,000 will be started in a few days. A. R. Morrison is manager.

The Detroit Metal & Steel Works, Detroit, has removed to a much larger plant at West Jefferson and Swain avenues.

Cincinnati

CINCINNATI, JUNE 24.

The inquiry for machine tools is still insistent, although only the larger sized machines are wanted. The supply of small lathes is sufficient to take care of demand. It is currently reported that the exportation of machinery is practically cut off, except that intended for Italy. Shipments to both France and England are very hard to make. Lately quite a large number of portable electric drilling machines have been forwarded to Italy, and the demand for these machines from there is holding up remarkably well. Foundries are making better deliveries of machine-tool castings, and little complaint is now heard on this score. Wood-working machinery is in heavy demand and shipyards are buying all kinds of equipment of this nature.

Common labor is in better supply, but skilled mechanics are scarce. Many machine-tool companies are contemplating turning to female labor for relief, and already a number of them have women employed on light work.

The Huenefeld Co., Cincinnati, sheet-metal worker, will add equipment to its power plant. Stokers will also be installed for the boilers now in use.

The Cincinnati Planer Co., Oakley, Cincinnati, will make an addition to its plant, 50 x 100 ft., of sawtooth roof construction. B. B. Quillen is vice-president and general manager.

The new addition to the plant of the Cincinnati Bickford Tool Co., in Oakley, is now occupied and all machinery installed.

The Cincinnati Steel Castings Co., Cincinnati, has awarded contract for an extensive addition to its plant in the Camp Washington district.

The Streine Tool & Mfg. Co., New Bremen, Ohio, will make an addition, 64 x 65 ft., of regular mill construction. The company is in the market for a cylindrical grinder and also for several planers. Frank H. Streine is president.

The Central Equipment & Mfg. Co., Columbus, Ohio, has been incorporated with $10,000 capital stock by A. H. Hillhouse and others.

The Adams Co., Ironton, Ohio, will be incorporated with $25,000 capital stock to manufacture a stamp-vending machine. E. B. Adams is one of the incorporators.

The Lucius Reinforced Tank Co., Wooster, Ohio, has been incorporated with $50,000 capital stock to manufacture a metal pressure tank. Christian V. Lucius is one of the incorporators.

The Stitt Ignition Co., Columbus, Ohio, recently incorporated to make spark plugs, will soon be in the market for automatic screw machines and also butt welding machines. Its plant will be at 16 East First Avenue.

The J. Van Gombos Machine & Tool Co., Cincinnati, has been incorporated with $10,000 capital stock to deal in machinery and machine tools. Gabriel H. Wolf, Provident Bank Building, is one of the incorporators.

Cleveland

CLEVELAND, JUNE 24.

The J. D. Fate Co., Plymouth, Ohio, has been reorganized by the election of John A. Root, president; Charles E. Heath, vice-president, and H. R. Sykes, secretary and treasurer. The reorganization was necessitated by the recent death of Harry S. Fate, who was president and general manager.

The contract for a new factory building to be erected by the U. S. Automatic Co., Amherst, Ohio, has been awarded to the Austin Co., Cleveland. This will be a one-story structure, 120 x 160 ft., with an ell 40 x 120 ft., to be used for a power house. With the completion of the extensions the capacity of the plant will be about doubled.

The Production Pattern Co., Cleveland, has secured quarters at 1251 West Third Street, and will engage in the manufacture of wood and metal patterns. Henry Wooster is president.

The L. H. Kendall Tire & Rubber Co., Akron, will establish a plant in Massillon, Ohio, for the manufacture of tires and other rubber products.

The Sandusky Tire & Rubber Co., Sandusky, Ohio, has placed contracts for the erection of a new plant. This will be of brick and steel construction, 140 x 460 ft., part three stories and part one story.

The Canton Steel Foundry Co., Canton, Ohio, is planning extensions to its plant. This company is engaged on Government work for the Morgan Engineering Co., Alliance, with which it is affiliated.

The Central South

LOUISVILLE, JUNE 24.

Arrangements for establishing the Louisville Industrial Foundation in Washington for war orders have been completed, with the exception of securing the proper man to take charge. Metal-working companies are much pleased with outlook, as several foundries have not had enough gray iron casting business for several months.

The Louisville Cement Co., Speed Building, Louisville, plans the installation of machinery at its cement mill at Speed, Ind.

The American Car Works, Jeffersonville, Ind., has started work on the construction of a building to manufacture chains, principally as wagon parts for the Government.

The Eureka Machine Tool & Supply Co., Winchester, Ky., has leased quarters and will establish a new machine shop at once.

The Shuler Axle Mfg. Co., Detroit, Mich., is establishing a branch plant at Jones and N streets, Louisville.

The W. R. Martin Broom & Mop Co., Louisville, will install additional equipment, doubling the present capacity.

The Middlesboro Ice Mfg. Co., Middlesboro, Ky., will rebuild the engine room and part of its plant recently damaged $10,000 by fire.

The Inman Veneer & Panel Co., Louisville, contemplates the establishment of a private power plant.

The National Process Co., Speed Building, Louisville, is in the market for vacuum pumps, condensers, evaporating machinery, etc.

Briggs, Shaffner & Co., Winston-Salem, N. C., will rebuild their foundry and machine shop recently burned.

The Wadsworth Electric Mfg. Co., Covington, Ky., will equip shops for manufacturing electrical supplies. The company has a capital of $100,000. George B. Wadsworth and others are interested.

The Illinois Central Railroad Co. is erecting additions at Fulton, Ky., and will need an 85-ft. electric turntable and two 150-hp. boilers.

Pitts & Sons, Waverly Hill, Ga., is in the market for a 30-hp. horizontal oil engine.

The Elk Gas Coal Co., Clendennin, W. Va., is in the mar-

ket for an electrically operated exhaust fan, pump and hoisting machinery.

The J. J. Reilly Mfg. Co., Louisville, manufacturer of steam pumps, has increased its capital from $50,000 to $150,000.

St. Louis

ST. LOUIS, JUNE 24.

The Conway Compress Co., Conway, Ark., will improve the capacity of its plant, adding about $40,000 worth of machinery.

The Liberty Gin & Truckers' Co., Lecompte, La., has been incorporated with a capital stock of $25,000 by E. L. Henry, B. A. Babb and E. E. Pressburg and will equip a ginning plant.

The Shippers Compress Co., Muskogee, Okla., has increased its capital by $50,000 and purchased additional machinery.

The Penal Farm, Tucker, Ark., is in the market for about $3,500 worth of electric light plant equipment.

Ponca City, Okla., G. C. Johnston, clerk, will expend about $35,000 on electric light plant equipment.

The Louisiana Saw Mill Co., Glenmoro, La., has been incorporated with a capital stock of $2,000,000 by J. B. White, Kansas City, Mo.; C. E. Slagle, Clarks, La.; C. C. Sheppard, Oakdale, La., and A. T. Hemingway, Kansas City, and will acquire and extend a number of mills.

The American Hinge Co., Muskogee, Okla., has been incorporated with a capital stock of $100,000 by H. A. Paul, B. Broaddus and Fred W. Davis, and will establish a plant for the manufacture of hinges.

The Pryor Carburetor Co., Oklahoma City, Okla., has been incorporated with a capital stock of $60,000 by R. M. Pryor, C. C. Leech and H. W. Munson, and will equip a plant to manufacture carburetors.

The Midland Motor Car & Truck Co., Oklahoma City, Okla., will build a second unit with a daily capacity of 20 trucks. It will later add equipment for the construction of airplanes.

Justin Matthews, Urquhart Building, Little Rock, Ark., will receive bids for electrically driven vacuum pumps for District No. 1, North Little Rock.

The Delta Shipbuilding Co., New Orleans, has been incorporated with a capital stock of $250,000 by Richard B. Stanford, Charles A. Koch and others, and will equip a plant to build concrete ships and barges of 1000 to 2000-tons capacity.

Stonewall, Okla., will buy $10,000 worth of additional waterworks equipment.

W. T. Letts, St. Joseph, Mo., will rebuild his cooperage plant destroyed with a loss of $35,000 on machinery.

Texas

AUSTIN, JUNE 22.

F. E. Powell, San Juan, will construct a garage and install an automobile repair shop to cost $75,000.

The McKinney Compress Co., McKinney, which was recently incorporated with a capital stock of $50,000, has purchased a plant and will install new machinery. George Findberg, Abilene, Tex., is president.

Wetegrove & Co., Mercedes, contemplate constructing a large precooling and ice plant. Considerable machinery, including a 100-hp. engine will be required.

The City Council, San Augustine, will install new machinery in the municipal waterworks.

The San Augustine Oil Mill Co., San Augustine, will install a 75-hp. crude oil engine and other machinery in its mill. J. O. Payne is general manager.

The Universal Tire & Rubber Co., Houston, has purchased 30 acres on the ship channel, on which it will erect a plant for the manufacture of automobile tires and tubes. The initial unit will give employment to about 500 men.

Louis J. Wilde, mayor of San Diego, Cal., and associates, contemplate erecting a steel shipbuilding plant at Beaumont.

The Orange Ice, Light & Water Co. will purchase a new 750-kw. generator and other machinery for its electric light and waterworks plant.

W. D. Allen, Miles, and associates will construct a dam across the Concho River about 16 miles northeast of San Angelo for the purpose of creating a reservoir for irrigating about 400 acres. Pumping machinery will be required.

The Lone Star Truck & Tractor Association, San Antonio, has purchased 18 acres adjoining the shops of the International & Great Northern Railway on which it will erect a plant for the manufacture of motor trucks, tractors and trailers. It will consist of five units and will give initial employment to about 400 men. The company is operating a temporary plant at Dallas. A. O. Sairis is district manager.

Austin, Tex., has issued $100,000 in bonds, the proceeds to be used for the construction of a sewage disposal plant.

San Francisco

SAN FRANCISCO, JUNE 18.

The demand for machine tools continues good, although many buyers are still waiting for Government action in regard to assisting in the purchase of large tools. At the same time the dealers say that the difficulty of getting shipments of large tools continues as acute as ever. The demand for shop and mill supplies and small machine tools is still strong, and most business outside of direct Government work is done with these smaller machines.

The Acme Engine Co., San Francisco, which was organized a little over a year ago, has just closed a lease for the adjacent premises, formerly occupied by the Metal Weld Co. This gives the engine company more than double the ground floor space it formerly occupied. The company has installed an Acme turret lathe, a Jones & Lamson lathe and two new drill presses, and will add other machines.

The Columbia Steel Co., Pittsburg, Cal., is installing two more large cranes.

The Main Iron Works, San Francisco, recently took over the Doble Machine shops at Seventh and Hubbell streets. In its new outfitting dock on China Basin the company has installed new shears capable of handling 50 tons, and other machinery.

The Pacific Coast Boiler Works, San Francisco, is building a one-story reinforced concrete boiler plant on Main Street at a cost of $10,000.

The Pacific Foundry Co., San Francisco, has just contracted for the erection of a one-story steel and corrugated iron factory building to cost $45,000.

The Moore Shipbuilding Co., Oakland, has contracted for additions to its planing mill to cost $12,000.

The E. G. Cox Mfg. Co., Oakland, has been incorporated to manufacture tractor attachments for automobiles of a type invented by E. G. Cox.

The Bay Point Iron Foundry, Bay Point, has been incorporated with a capital of $10,000 by T. C. Disher, P. S. Brown, M. Paganini, Mario D. Paganini and Joseph Bentley.

The Eclipse Pulley Covering Co. of California, Los Angeles, is about to build a plant in that city.

The Carnation Milk Products Co. of California, San Francisco, a new corporation, is about to erect a plant in this state for the manufacture of evaporated milk.

The Saftyford Starter Co., Los Angeles, has been incorporated by Charles Trephagan, R. A. Jackson and F. C. Stillwell, and will build a plant in Los Angeles.

The Pacific Northwest

SEATTLE, WASH., June 18.

Every plant in the city equipped to turn out supplies and machinery is swamped with orders and operating practically 24 hr. per day. One large manufacturing company states that it has been flooded with inquiries from Pacific Coast shipyards, the Gulf states, the East and from the Orient. Many manufacturers are unable to quote on more than 50 per cent of the business offered. Shipyards and other industries engaged in war work are constantly expanding to meet the increasing demand from the Government.

The lumber situation is more satisfactory than it has been for a long period. Mills are running within five per cent of capacity and orders are piling up in excess of supply. Sawmill and shingle mill machinery are in urgent demand and many old plants that have been idle for some time are being overhauled and put in operation. Second-hand equipment is moving readily.

The Columbia River Shipbuilding Co., Portland, recently secured contracts for 14 8800 ton ships, totaling $25,000,000. It is constructing two new ways and will enlarge its working force.

The Everett Steel Co., Everett, Wash., is making rapid progress on its plant in Everett, and expects to begin operations within 30 days. It will manufacture steel castings for Northwest shipyards.

L. J. Simpson, North Bend., Ore., plans the establishment of a sawmill and small shipbuilding plant in that city. The

shipyard will have four to six ways, and the sawmill will have a daily capacity of 50,000 to 60,000 ft.

The United Steel Co., Everett, recently purchased a site and has let contracts for the construction of new shops, the main building to be 70x200 ft.

Plans have been completed for the new machine shop to be built by the Acme Forge Works at Spokane Street and East Marginal Way, Seattle.

The Erickson Engineering Co., Seattle, will erect two new buildings at its shipbuilding plant, 60x140 ft. and 49x63 ft., respectively, at a cost of $10,000, exclusive of equipment.

The plant of the Victoria Machinery Depot, Victoria, B. C., is engaged in fitting boilers in Government ships.

The Allan & McKelvie Engineering Co. Ltd., Vancouver, B. C., plans the immediate construction of a new galvanizing plant, 40x80 ft., at 1214 Pender Street East.

The Vulcan Mfg. Co., Seattle, contemplates remodeling its storage building and converting it into a machine shop. Craneways and considerable machinery will be installed.

The plant of the Fischer Lumber Co., Marcola, Ore., was recently destroyed by fire with a loss of more than $40,000. The mill had a daily capacity of 60,000 ft.

The Lamb Machine Co., Hoquiam, Wash., plans to start operations within 30 days in its new plant which is nearing completion. Government work will be handled exclusively.

The plant of the Smith Lumber Co., Portland, was recently destroyed by fire with a loss of about $30,000. It had just been leased to the Kiernan & Kern Shipbuilding Co.

The Vaughn Motor Works, Portland, will build two additions to its plant, 36x70 ft. and 50x80 ft., respectively. One structure will be used for a foundry and the other for a warehouse and showroom.

The Northwest Process Co., Portland, contemplates erecting additions to its plant, including a machine and carpenter shop, 50x50 ft., brass foundry, 50x50 ft., and coppersmith shop, 50x150 ft. An overhead crane, forges, hydraulic press and heavy power hammer will be installed.

The American Can Co., Vancouver, Wash., will call for bids within 90 days for the erection of a four-story concrete manufacturing plant.

The merger of the Seattle Construction & Dry Dock Co. with the Skinner & Eddy Corporation, Seattle, will result in extensive changes and alterations. A new dock 700 ft. long will be built, on which will be located coppersmith, pipe, pattern and joiner shops. A plate and angle bending shed, 82x260 ft., will be built and another foundry and machine shop, the latter to be 600 ft. long. The shops will cost about $150,000, and the new dock $75,000.

The Stuvard Machinery Co., Everett, Wash., has been incorporated by Gust Anderson and Andrew Nyelin, with a capital stock of $50,000. It is stated that machine shops will be established.

The plant of the Portland Lumber Co., Portland, was recently damaged by fire with a loss of $50,000.

The American Concrete Pipe & Shipbuilding Co., Seattle, which is planning for the establishment of a concrete shipbuilding plant on Lake Washington, announced that six ways originally contemplated will be increased to 10, which will permit the construction of 10,000-ton concrete ships in conjunction with three 500-ton concrete barges. A concrete pipe plant will also be built which will be double the size of the company's plant in Tacoma. W. F. Hallowell is secretary.

Canada

TORONTO, June 24.

The Canadian Government has further extended its restrictions on exports and machinery and metals have been prohibited except under license. Applications for individual licenses must be made to the War Trade Board, Ottawa, Ont.

The construction of the big steel shipbuilding plant at Halifax, N. S., by the Halifax Shipyards, Ltd., will be commenced shortly and within three months it is planned to lay the keels of three 10,000-ton freighters. The expenditure will be between $3,750,000 and $4,000,000, and as soon as plans are completed contracts for the erection of the plant will be placed. J. W. Norcross is president.

Bids are being received by the engineer, C. Lessard, 147 Mountain Hill, Que., for a 12-in. deep well electric pump, with a daily capacity of 150,000 gal.

Contracts have been awarded for the erection of a $1,800 000 plant at Shawinigan Falls, Que., for the American Products Co.

The Martin Pump & Machine Co., Ltd., Toronto, is building an addition to its plant to cost $40,000.

Kentville, N. S., is making preparations for the erection of an electric light plant to cost $50,000. Booker & McKechnee, Davidson Building, Halifax, N. S., are the engineers.

Bids are being received by M. Peterson, secretary, Winnipeg, Man., until July 2, for one 200 kw. generator.

Milton & Prentiss, 1504 Traders Bank Building, Toronto, are in the market for a 10-in. belt driven air compressor for 100 lb. per sq. in.

The shingle mills at Burnaby, B. C., owned by Pearson & Co., which were recently destroyed by fire with a loss of $60,000, will be rebuilt and new machinery purchased.

The Town Council, Renfrew, Ont., will purchase a twin horizontal enclosed turbine waterwheel and a 12-in. two-stage pump.

The O'Brien Motor Services, Ltd., Montreal, has been incorporated with a capital stock of $250,000 by Richard T. Heneker, Henry N. Chauvin, Montreal; Christina Imrie, Westmount, and others to manufacture motors, engines, machinery, trucks, etc.

The Monarch Metal Co., Ltd., Hamilton, Ont., has been incorporated with a capital stock of $250,000 by John R. Marshall, Arthur B. Turner, George A. Young and others to manufacture machinery, tools, implements, etc.

The Electric Welding & Shipbuilding Co. of Canada, Ltd., Montreal, has been incorporated with a capital stock of $50,000 by John J. Meagher, Henry N. Chauvin, James E. Coulin and others, to build boats and to manufacture machinery, engines, etc.

The Canadian Driver-Harris Co., Ltd., Walkerville, Ont., has been incorporated with a capital stock of $150,000 by Leon O. Hart, LeRoy Edwards, Jersey City, N. J.; John H. Coburn, Walkerville, and others to manufacture wire, machinery, etc. It is the intention of the company to commence the erection of a plant for the manufacture of alloys at Windsor, Ont.

The Troja Steamship Co., Ltd., Montreal, has been incorporated with a capital stock of $1,000,000 by Edouard F. Surveyer, Outremount, Que.; William L. Bond, Pierre Arbour and others, Montreal, to build and operate ships, drydocks, etc.

The French Bay Lumber Co., Ltd., Sault Ste. Marie, Ont., has been incorporated with a capital stock of $150,000 by Joseph P. Walsh, 76 Grosvenor Street; Charles J. McLaughlin, Irene Hickey and others of Toronto, to manufacture lumber, wood products, etc.

Goodwin & Co., Ltd., Sarnia, Ont., has been incorporated with a capital stock of $40,000 by John F. Goodwin, Angus M. Lott, John Garroch and others to manufacture gas water heaters, machinery, appliances, etc.

The sawmill at Irishtown, N. B., owned by Chipman McFarlane, Mountain Road, Moncton, N. B., was destroyed by fire with a loss of $30,000. It will be rebuilt and new equipment purchased.

The Dominion Steel Foundry Co., Depew Street, Hamilton, Ont., has had plans prepared for the erection of a plant estimated to cost $2,500,000.

Bids will be received by the Essex Border Utilities Commission, at the office of Morris Knowles, Ltd., 8 Royal Bank Building, Windsor, Ont., until July 8, for furnishing and testing three motor driven pumping units, one with a capacity of 500 Imperial gal. per min. and two with a capacity of 1000 Imperial gal. per min.

H. Corks & Co., Georgetown, Ont., are in the market for an engine lathe.

The engine room, pattern and molding shops of the Canada Foundries, Ltd., Hamilton, Ont., were damaged by fire June 19 and considerable machinery destroyed. The loss is estimated at $40,000. The company will rebuild.

Government Purchases

WASHINGTON, JUNE 24.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, at an early date, for the following machine tools: Schedule 1843, 1 horizontal boring, drilling and milling machine, 1 horizontal and vertical Duplex milling machine and 2 motor-driven profiling machines, all for Washington.

According to a Berlin daily paper some of the German shipbuilding firms have considerably increased their capital. Some of the largest firms, like the Vulcan, of Stettin and Bremen, have not yet followed suit. Besides these increases in the capital of existing concerns, a considerable number of new firms have been established and more are to be founded.

THE IRON AGE ADVERTISING GROUP PLAN

Advertisements are grouped according to the product advertised and these general classifications are arranged to appear in the order shown below:

See the Buyers' Classified Index near the back cover for complete list of the products advertised in The Iron Age

IRON *and* STEELS
Generally classified under Rolled Products
PIG IRON, COAL, COKE, FIREBRICK, REFRACTORIES
FERRO-ALLOYS
BRASS, COPPER, NICKEL, SILVER, BABBITT, ALUMINUM, ZINC, SPELTER AND OTHER NON-FERROUS METALS
FORGINGS
Iron, Steel, Drop, Brass and Copper
CASTINGS
Steel, Malleable, Gray Iron, Non-Ferrous, Die
DIE, JIG, TOOL, FIXTURE WORK *and* GAUGES
STAMPINGS, PRESSED METAL WORK
SCREWS, SCREW MACHINE PRODUCTS
BOLTS, NUTS, RIVETS, WASHERS, NAILS, SPIKES
SPRINGS
Wire Shapes and Parts
WIRE
Wire Cloth, Wire Fence, Wire Screens, Wire Rope, etc.
PERFORATED METALS
PIPE, TUBING
All Kinds
GEARS
BEARINGS
Ball and Roller
BUSHINGS
ELECTRICAL APPARATUS
Motors, Generators
TRANSMISSION MACHINERY
BELTING, BELT FASTENERS, DRIVING CHAINS, WIRE CHAINS
MATERIAL HANDLING MACHINERY AND APPARATUS
Conveyors, Elevators, Grab Buckets, Cranes, Hoists, Industrial Railways, Factory Trucks, Motor Trucks
FOUNDRY MACHINERY, EQUIPMENT *and* SUPPLIES
FURNACES, OVENS. *All Kinds*
POWDERED COAL *and* EQUIPMENT
INDICATING *and* RECORDING INSTRUMENTS
Pyrometers, Thermometers, Meters, Counters, etc.
WELDING MACHINES, APPARATUS, OXYGEN, WELDING
GALVANIZING, RUST-PROOFING, SHERARDIZING
Paints, Lacquer and Enamels
HEAT TREATING
Case Hardening, Annealing and Tempering
TANKS
STRUCTURAL WORK, ENGINEERS, BRIDGES, BUILDINGS
FACTORY *and* MILL EQUIPMENT
Roofing, Sash Operating Devices, Lighting and Heating Apparatus, Factory Stools, Shelving, Lockers, Jacks, Clocks, Steel Stamps, Checks, Goggles, Scales, Box Strapping, Ventilating Apparatus, Safety and Sanitary Appliances, Lubricants, Cutting Oils, Oilers, Oil Filters, Flooring, Forges, etc.
EDITORIAL SECTION

MACHINE TOOLS
Arranged in following order: Drilling Machines, Lathes, Automatic Screw Machines, Machines for Boring, Planing, Shaping, Milling, Grinding
GRINDING WHEELS
Wheel Dressers, Abrasives, etc.
CUTTING OFF MACHINES
SAWS
All Kinds
TWIST DRILLS, REAMERS, TAPS, DIES, MILLING CUTTERS, SCREW CUTTING TOOLS, *etc.*
CHUCKS, TOOL HOLDERS
FILES, WRENCHES, VISES, ANVILS
ELECTRIC *and* PNEUMATIC TOOLS
PIPE THREADING *and* CUTTING MACHINERY
WIRE WORKING *and* FORMING MACHINERY
BOLT, NUT, NAIL, RIVET *and* SCREW MACHINERY
RIVETERS, PUNCHES, SHEARS
SHEET METAL WORKING MACHINERY
PRESSES
For stamping and blanking
PRESSES
Forging, Hydraulic
HAMMERS
Power, Steam, Drop
ROLLING MILL MACHINERY, ROLLS
Machinery for Steel, Wire, Tube, Plate Mills, etc.
POWER PLANT EQUIPMENT, APPLIANCES *and* SUPPLIES
Boilers, Pumps, Engines, Air Compressors, Gas Producers, Fuel Oil, Steam and Pipe Specialties, Packings, Felts and Insulating Material
CLEARING HOUSE SECTION
Contains the Largest Selection of Used Machinery, Materials and Equipment
WANTED SECTION
A Place Where Buyers Advertise Their Wants
BUSINESS OPPORTUNITIES SECTION
Opportunities to Buy or Lease Factories, Mills, etc. Boards of Trade Opportunities, Capital and Agencies Wanted, etc.
THE WEEKLY MEETING PLACE OF THE EMPLOYER *and* EMPLOYEE
For Help and Situation Wanted Advertisements
PROFESSIONAL ANNOUNCEMENTS
Of Engineers, Chemists, Metallurgists
CONTRACT WORK SECTION
Outside Work Wanted on Contract Basis; the Market Place for the Disposal of Surplus or Idle Manufacturing Capacity
BUYERS' CLASSIFIED INDEX
Where all materials and products advertised herein are classified under their proper headings
ALPHABETICAL INDEX OF ADVERTISERS
About 1800 names of regular advertisers

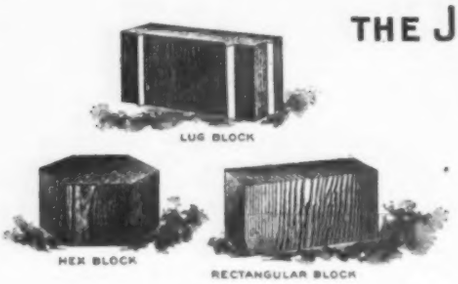
THIS WEEK'S ANNOUNCEMENT

Your possible buyers have many claims on their attention.
Don't let them forget YOU.

THE IRON AGE, published Thursdays of each week by The Iron Age Publishing Company, 239 West 39th Street, New York City.
Advertising Manager, C. S. Baur, 239 W. 39th Street, New York.
New England Manager, D. C. Warren, 239 W. 39th St., New York.
New York Manager, Fritz J. Frank, 239 W. 39th Street, New York
Philadelphia Mgr., H. H. Roberts, Real Estate Trust Bldg., Phila.
Pittsburgh Manager, W. B. Robinson, Park Bldg., Pittsburgh.
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Pacific Coast Manager, W. A. Douglass, 320 Market St., San Francisco, Cal.

RESULTS

H. G. JENNISON, PRES'T. G. G. CARVER, VICE PRES'T. A. G. WRIGHT, SEC'Y & TREAS.



THE JENNISON-WRIGHT COMPANY

Kreolite Blocks

"The Paving that's saving"

STREET PAVING BLOCKS
STRUCTURAL TIMBERS
RAILROAD TIES
PILING
FACTORY FLOORS
WAREHOUSE FLOORS
STABLE FLOORS
BRIDGE FLOORS
KREOLITE WOOD PRESERVATIVE

2463 BROADWAY

TOLEDO, OHIO. U.S.A.

Mar. 14, 1918.

The Iron Age,
No. 239 West 39th St.,
New York City.

Gentlemen:

We have taken page space semi-monthly in the Iron Age since 1913 and have found it very satisfactory.

We do not claim to be an alumnus of Pecan University, but have noticed that monkeys make no mistake when they want cocoanuts, they go to a cocoanut tree, squirrels hike for the hickories and walnuts, so when we wanted to reach the metal trades. just as naturally turned to the Iron Age.

Our business has more than doubled each year since advertising in same

THE JENNISON-WRIGHT COMPANY

BY Isaac Wright

Advertising Manager.



This is Letter No. 11

BETHLEHEM STEEL COMPANY

SOUTH BETHLEHEM, PENNSYLVANIA

PIG IRON: Basic, Bessemer, Foundry, Low Phosphorus, Mayari, Ferro-Manganese, Spiegeleisen.

CASTINGS: Steel and Iron, Brass, Bronze and Manganese.

FORGINGS: Drop, Hammered, Hydraulically Pressed, Solid and Hollow, Rough, and Finished Machined; Cement Mill, and Ore Crusher Balls.

RAILS: Standard, Girder, Guard, High Tee, Industrial; Splice Bars, Tie Plates, Bolts, Frogs, Switches, Signals.

SWITCH STANDS: To Meet Every Track Condition; High, Intermediate and Low Stands, Adjustable and non-Adjustable.

MANARD ANVIL-FACE FROGS: Equipped with "Mayari" Never-Turn Bolts. All Bolts Receiving Side Thrust of Wheels are HEAT TREATED.

STRUCTURAL STEEL SHAPES: Bethlehem Beams, Girders and Columns; Standard Beams, Channels and Angles.

TOOL STEELS: Carbon, High Speed, Drill, Finishing and Special.

STANDARD, ALLOY AND SPECIAL STEELS: Chrome Nickel, Chrome Vanadium, Mayari, Case Hardened, Special; Treated, Tempered and Cold Drawn.

TIN PLATES: Black, and Tinned Plates; Stamping and Enameling Stock.

BAR IRON: Refined Bar Iron, Double Refined, Chain, Stay Bolt, Special Staybolt and Engine Bolt Iron.

BOLTS: All Kinds, Plain and Galvanized, Machine, Carriage, Lag, Plow and Patch; HEAT TREATED, Simple Alloy Mayari Steel Frog, Track and Fitting-Up Bolts.

NUTS: Hot and Cold Pressed, Cold Punched, and Forged, All Sizes, Shapes and Standards, Blank or Tapped, Chamfered, Trimmed and Reamed, Case Hardened, Castle, Semi-Finished and Finished.

RIVETS: Boiler, Bridge, Structural, Ship, Tank and Tap.

SPIKES: Steel and Iron, Standard Railroad, Screw Railroad Track, Universal Screw, Boat, Dock and Wharf, Pressed and Rolled.

ENGINEERS AND BUILDERS OF SPECIAL MACHINERY.

FORGINGS AND CASTINGS FOR LARGE MARINE ENGINES.

Hydraulic Beam and Gap Shears, Plate Bending Rolls, Intensifiers, Flanging and Forging Presses.

FURNACE AND FOUNDRY COKE AND COKE BY-PRODUCTS

Ammonium Sulphate, Benzol, Crude Naphthaline, Solvent Naphthas, Toluol, Tar.

PUMPING ENGINES FOR MUNICIPAL PURPOSES, GAS ENGINES.

NAVAL and COAST DEFENSE GUNS and MOUNTS, FIELD GUNS and HOWITZERS Gun Carriages, Limbers and Caissons, Gun Forgings, Torpedo Air Flasks, Armor Plate, Projectiles, Fuses, Cartridge Cases, Complete Rounds of Ammunition

WORKS AT

South Bethlehem, Pa.; Lebanon, Pa.; Reading, Pa.; Steelton, Pa.; Titusville, Pa.; Sparrows Point, Md.

WAREHOUSES AT

South Bethlehem, Pa. Lebanon, Pa. Boston, Mass. Cleveland, Ohio

GENERAL OFFICES: South Bethlehem, Pennsylvania

BRANCH OFFICES:

Atlanta, Ga. .....Candler Building
Baltimore, Md. ....Continental Building
Boston, Mass. .....Oliver Building
Chicago, Ill. .....People's Gas Building
Cleveland, O. .....Guardian Building
Detroit, Mich. .....Penobscot Building

New York, N. Y.....Trinity Building
Philadelphia, Pa. .....Morris Building
Pittsburgh, Pa. ..First Nat'l Bank Building
St. Louis, Mo. ..Boatmen's Bank Building
San Francisco, Cal..Monadnock Building
Washington, D. C.....Wilkins Building

25 Victoria Street, London, S. W. England
Santiago .....Chile

Rio de Janeiro.....Brazil
Lima .....Peru

Steel for Service



The first solid steel wheels made by Charles T. Schoen on October 5, 1903, were made from cast steel slabs. Later wheels were forged and rolled from rolled steel slabs.

In spite of defects due to imperfections in equipment and methods of manufacture, these early wheels gave most excellent service and some of them attained to phenomenal runs. This demonstrated the merits of the solid rolled steel wheel.

Since the Carnegie Steel Company engaged in the manufacture of rolled steel circular sections, particular attention has been paid to the selection of material and to improvements in equipment and methods of manufacture. In consequence, these products are now made exclusively from circular blooms cut to suitable lengths (disks), by whose use the very best distribution of metal in the finished product is attained.

Carnegie Rolled Steel Wheels

for railway and industrial uses represent the very best in modern methods of manufacture.

Particular attention is called to the Carnegie

Rolled Steel Gear Blank



This product is characterized by all the excellencies of the rolled and circular sections, proper distribution of material, excellent wearing qualities and toughness. Service tests demonstrate their high endurance under most severe operating conditions.

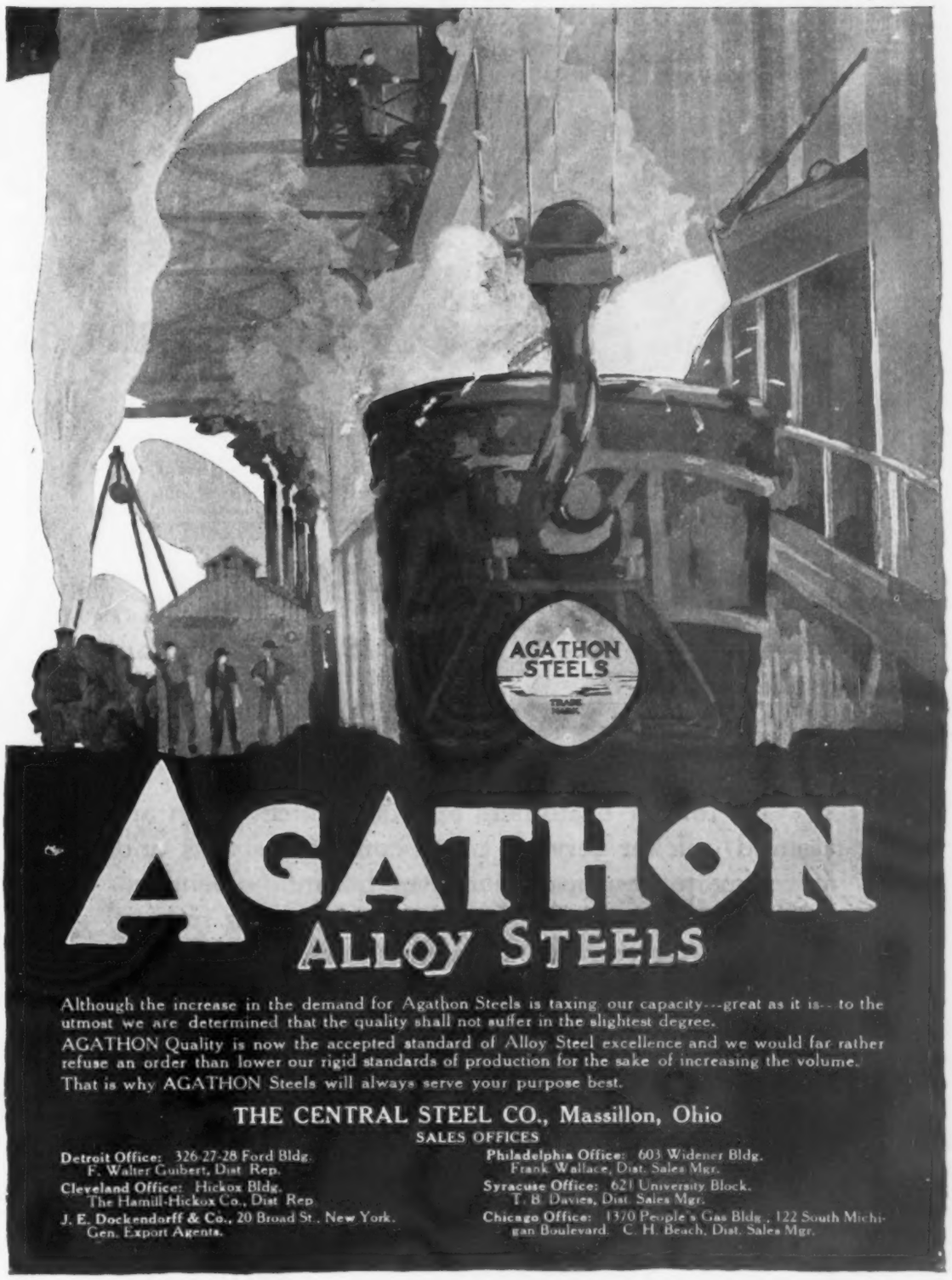
Our engineers will be pleased to consult with you as to your requirements.

The mark of quality 

It protects the user

Carnegie Steel Company

General Offices: Pittsburgh, Pa.



AGATHON
ALLOY STEELS

Although the increase in the demand for Agathon Steels is taxing our capacity---great as it is---to the utmost we are determined that the quality shall not suffer in the slightest degree.

AGATHON Quality is now the accepted standard of Alloy Steel excellence and we would far rather refuse an order than lower our rigid standards of production for the sake of increasing the volume.

That is why AGATHON Steels will always serve your purpose best.

THE CENTRAL STEEL CO., Massillon, Ohio

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T. B. Davies, Dist. Sales Mgr.

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Consolidated Under One Name and Management

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With Augmented STOCKS and Unified SERVICE Solicit Your Patronage

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Our former customers and other steel users are assured quicker service, more complete stocks and more favorable prices than ever before. (Send inquiries to nearest office.) Complete catalog free on request. Are you on our mailing list?

Warehouse Stocks Cover the Following Lines

Steel Tubing
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Bessemer Steels
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Electric Sheets
Tempered Strip Steel
C. R. Tool Steel Strips
Drill Rods
Cast Steel Wires and Rods

EDGAR T. WARD'S SONS CO.
BOSTON NEW YORK NEWARK CHICAGO PHILADELPHIA

SERVICE



Service is the watchword of the times.

The war can be won only by unstinted service.

The outcome depends as much on the machine as on the soldier.

In every field of mechanical design, nothing is or can be neglected that will directly or indirectly give increased service.

Thus, it has been proven anew, and in every field in which steel is used, that

VANADIUM STEEL

means service. In aeroplane, submarine, gun, army truck, light and heavy armor, automobile, locomotive, machine and cutting tool, the greater strength of vanadium steel is utilized to the one end—Increased Service.

American Vanadium Company

New York Pittsburgh London



INLAND
Basic Open Hearth
STEEL PRODUCTS

Looking Ahead

ENFORCED inactivity in selling does not mean that we are not looking to the future or that we are not developing the manufacture of our sheets and other products to the end that the lessons we have learned, and are learning, from the war will result in an increased value of our manufactured material.

INLAND STEEL COMPANY
First National Bank Bldg., Chicago
Works Indiana Harbor, Ind. and Chicago Heights, Ill.
Branch Offices - ST. LOUIS - ST. PAUL - MILWAUKEE - DENVER - DALLAS

ILLINOIS

Bar Mill Products

Open Hearth, Bessemer and Electric

Rounds	Half Ovals
Squares	Steel Tire
Flats	Reinforcing Bars (Plain and Cold Twisted)
Bands	Plow Beam Shapes
Angles	Channeled Flats
Channels	Toe Calk
Tees	U Bars
Zees	Sawmill Track
Half Rounds	Frog Fillers
Ovals	

Furnished in various sizes and lengths, in strict accordance with recognized Standard Specifications.

Will also consider requirements calling for special shapes and analysis.

Our other products include Structurals, Plates, Rails and Fastenings, Semi-finished Material and Pig Iron.

Illinois Steel Company

General Office, 208 S. La Salle Street

CHICAGO, ILLINOIS

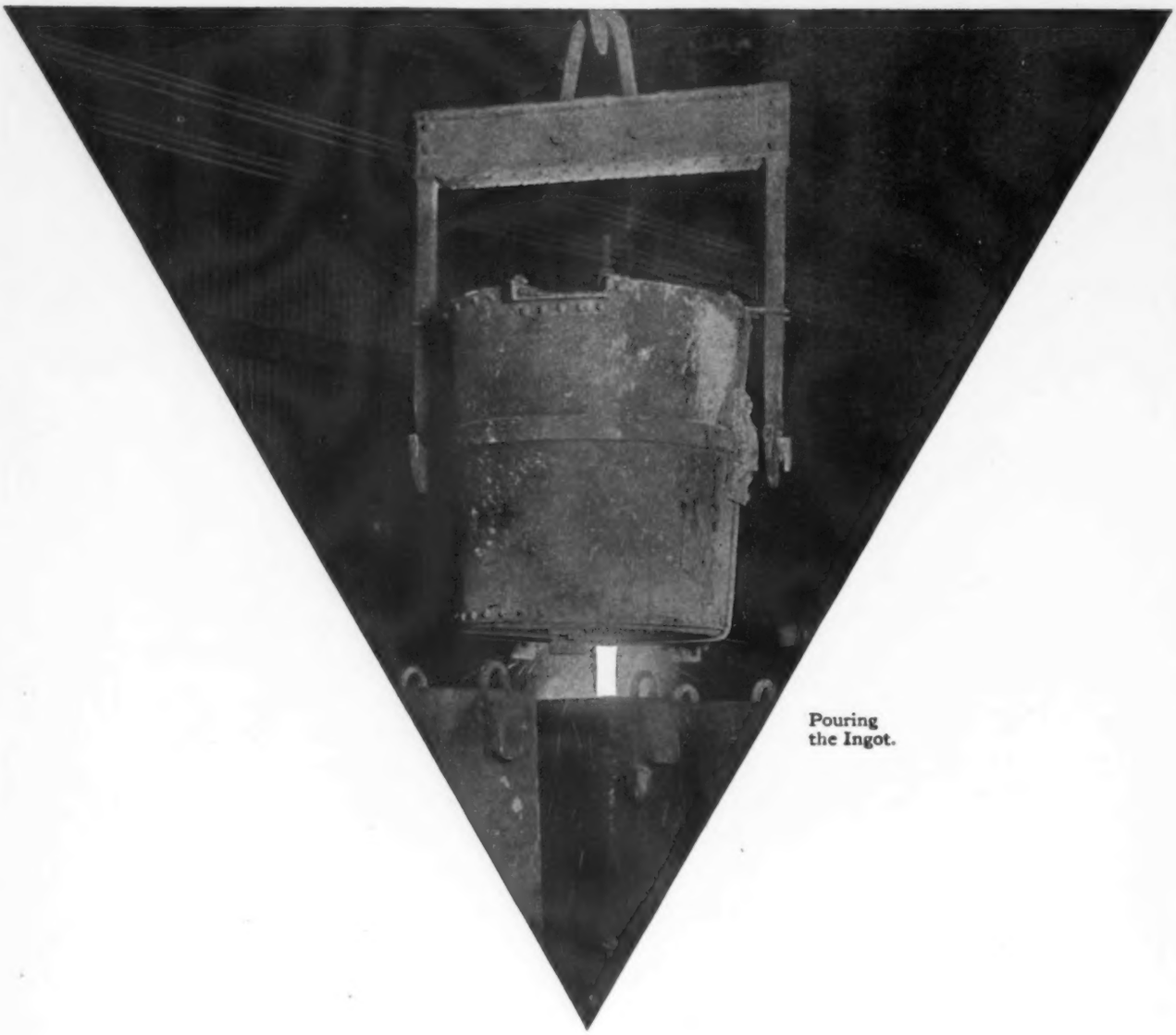
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Boston: John Hancock Bldg.
Buffalo: Marine Nat'l Bank Bldg.
Cincinnati: Union Trust Bldg.
Cleveland: Rockefeller Bldg.
Denver: First Nat'l Bank Bldg.
Detroit: Ford Bldg.
New Orleans: Maison Blanche
New York: Hudson Terminal Bldg.
Philadelphia: Widener Bldg.
Pittsburgh: Carnegie Bldg.
St. Louis: Third Nat'l Bank Bldg.
St. Paul: Pioneer Bldg.

Pacific Coast Representatives: U. S. Steel Products Co., San Francisco, Seattle, Portland, Los Angeles
Export Representatives: United States Steel Products Co., New York City

ILLINOIS

TIMKEN STEEL PRODUCTS

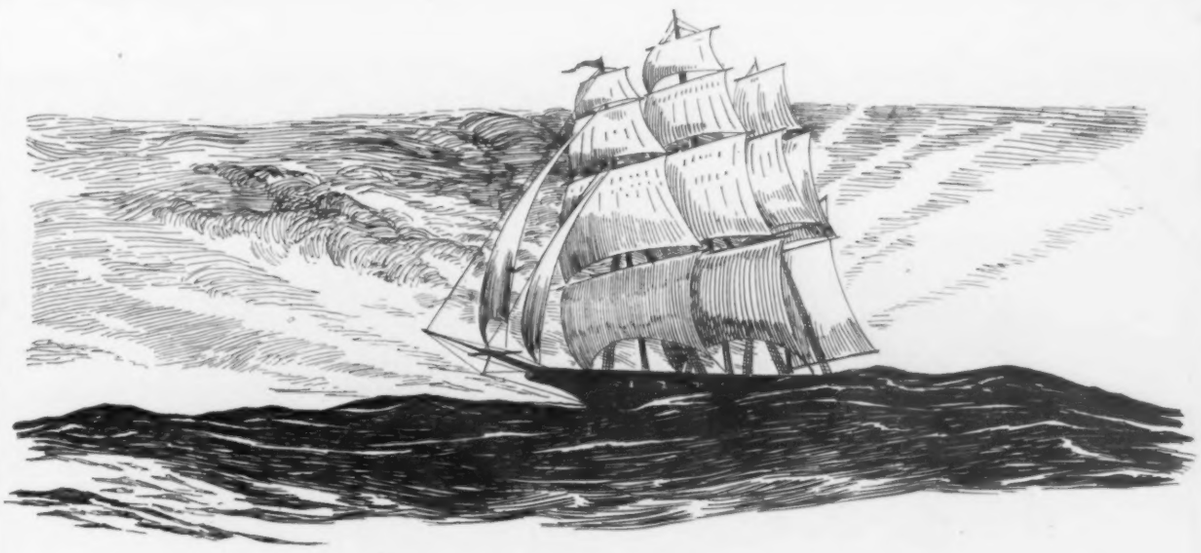


Pouring the Ingot.

At the present time we have for sale some free-cutting Bessemer Cold Drawn Screw Stock, capacity in our Cold Drawing Department for drawing bars, wire, shapes, etc., and capacity on our 22-inch rolling mill for the conversion of billets into rounds, squares, etc.

Timken Steel Products consist of electric furnace steel of all analyses in bars, billets, etc., and seamless steel tubes, cold-drawn bars, wire, shapes, etc.

THE TIMKEN ROLLER BEARING COMPANY
Canton, Ohio



The Old Yankee Clipper Back to Serve New Yankee Trade

The sailing ship has come back into its own and we may look forward to its dominating many of the trade routes of the world for a number of years. Goods shipped via these vessels on most of the trade routes cross the equator and must undergo the severest conditions of heat, dampness and possibly vermin.

If Americans are to take any considerable share of former German business one of the greatest aids will be the correct packing and marking of cases by manufacturers. If they will make certain that no goods leave their factories poorly packed for export shipment, this will be as effective co-operation as the supplying of goods that meet the foreign buyers' specifications.

The export merchant can furnish much information and render great service to the manufacturer, but under present conditions he cannot fairly be expected to undertake the expense and waste of time required to repack shipments at seaboard.

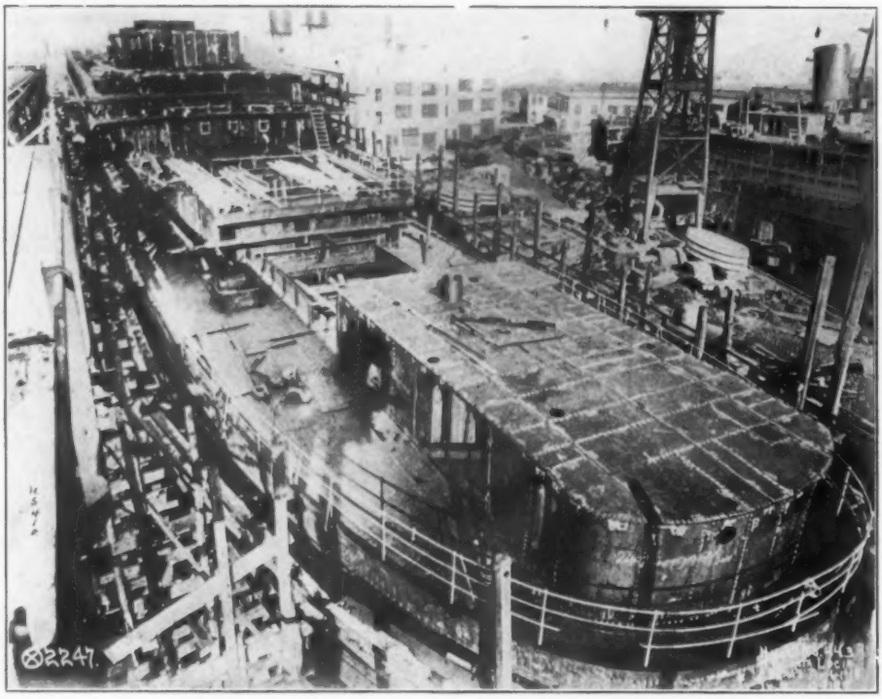
"Export Packing," a booklet prepared by us, gives many hints on correct packing for export. It will be sent to anyone interested in the subject.

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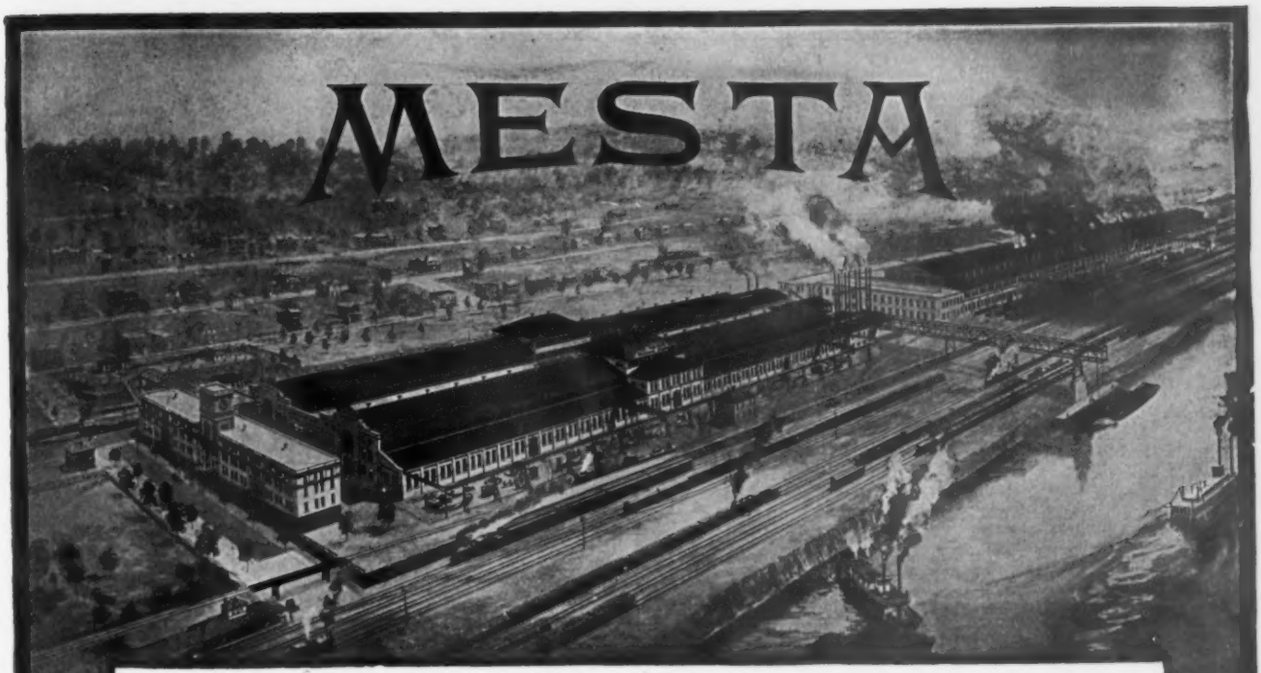
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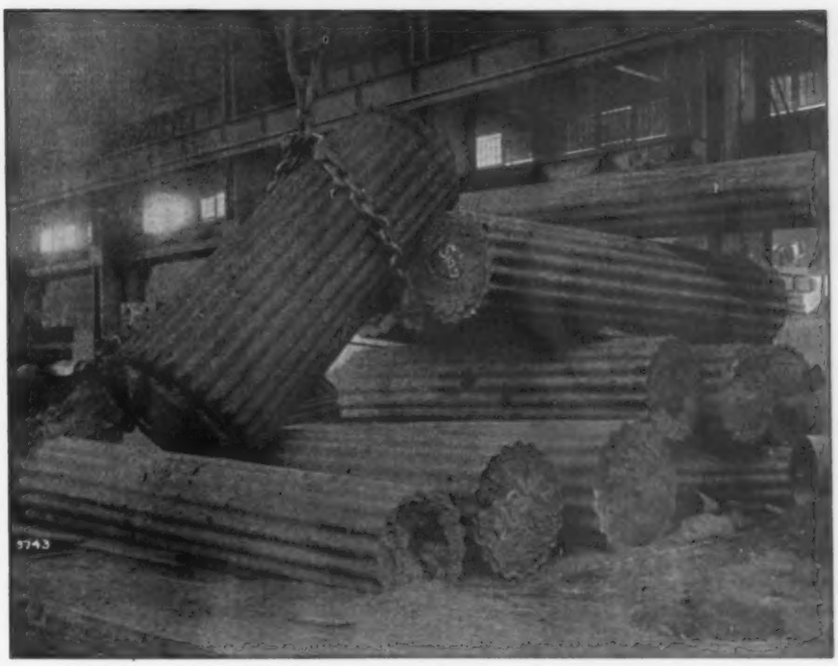
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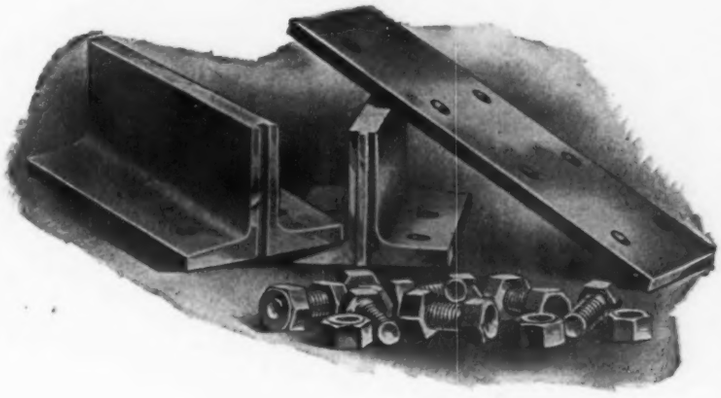
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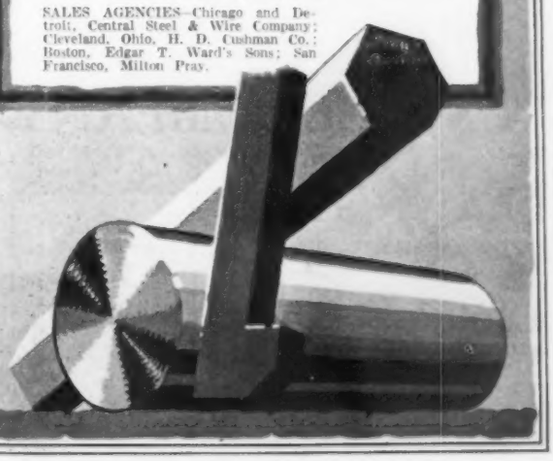
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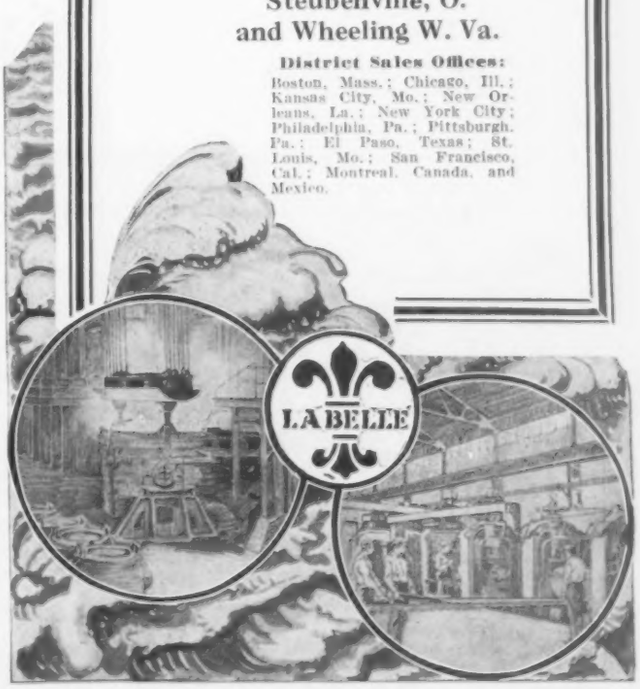
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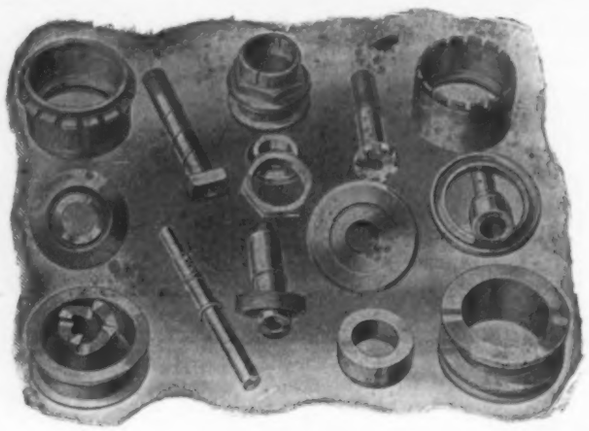
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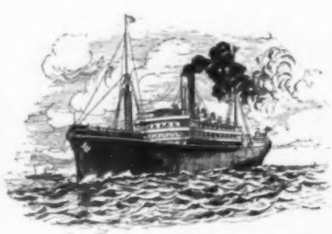
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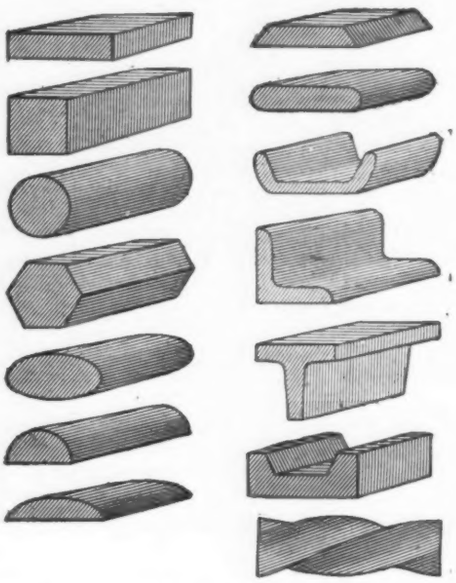
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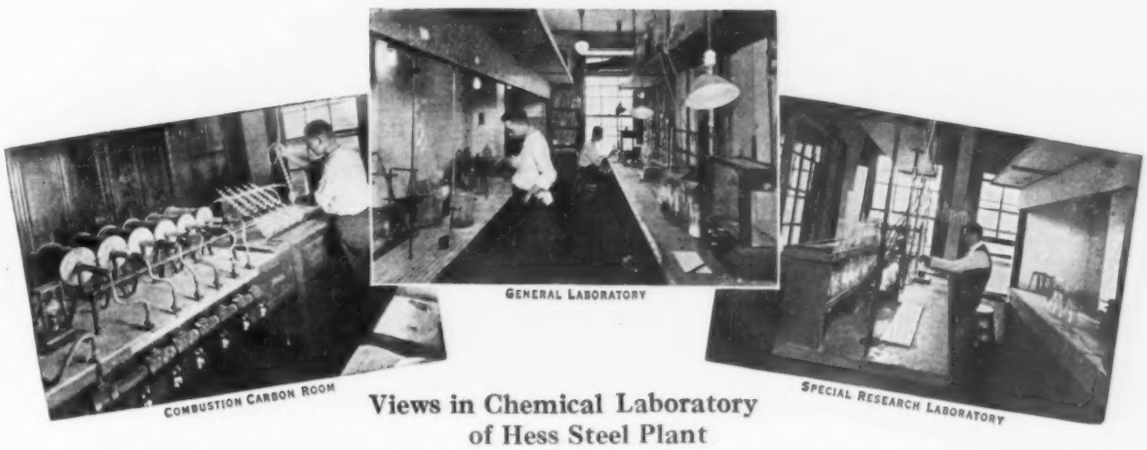
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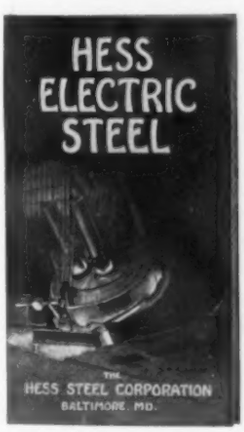
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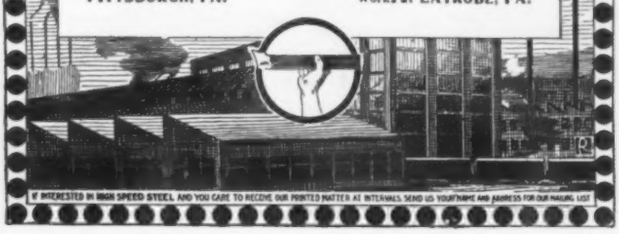
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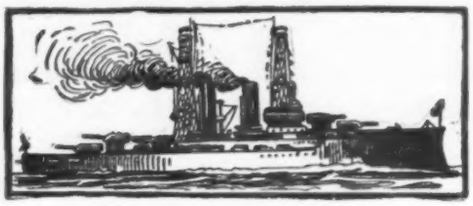
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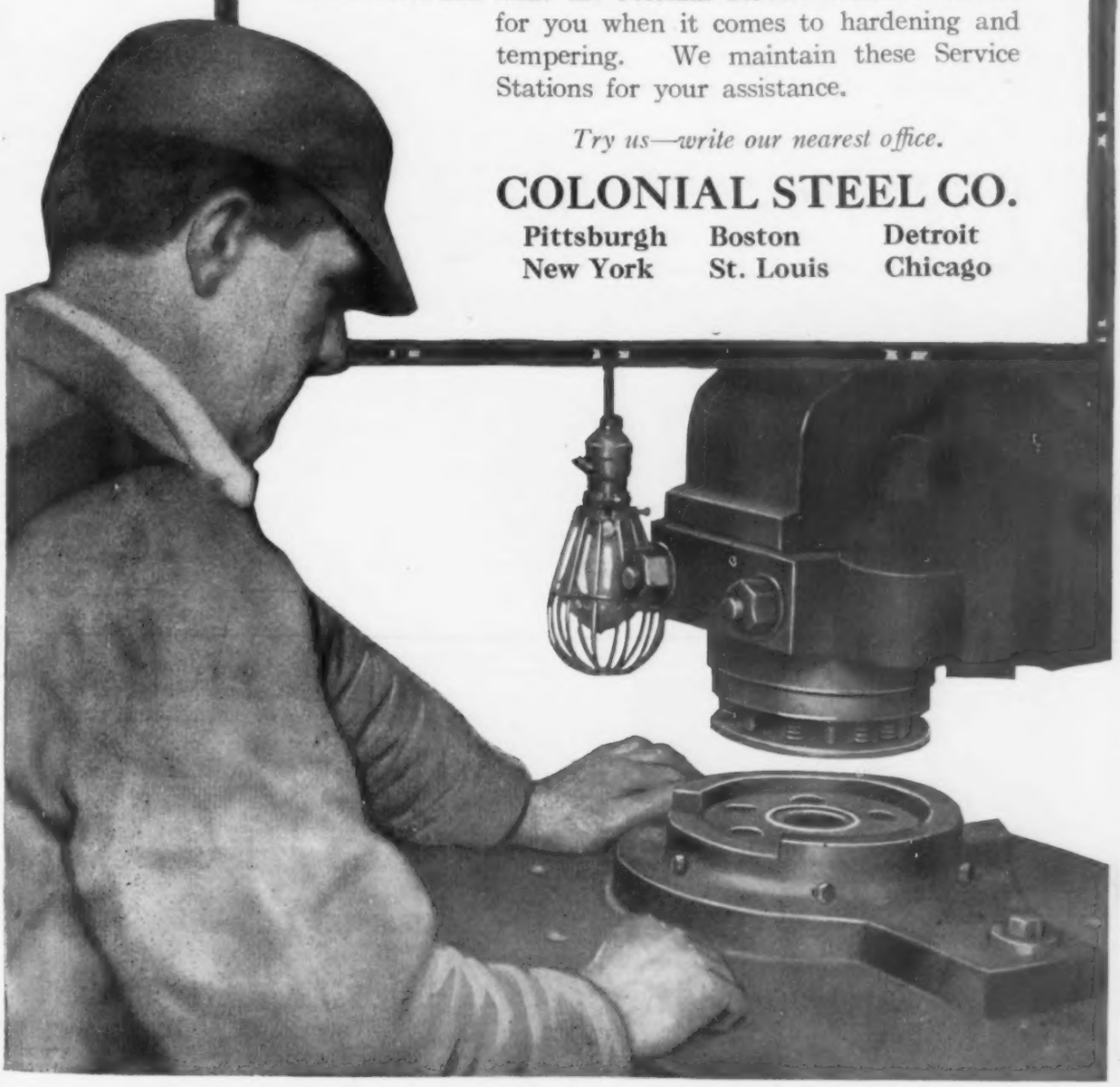
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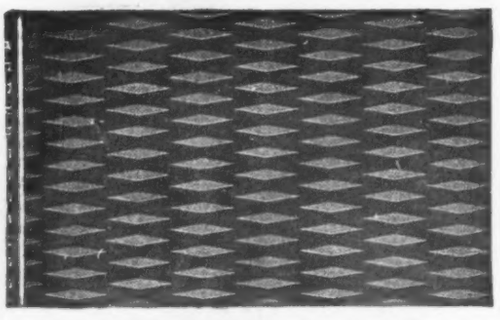
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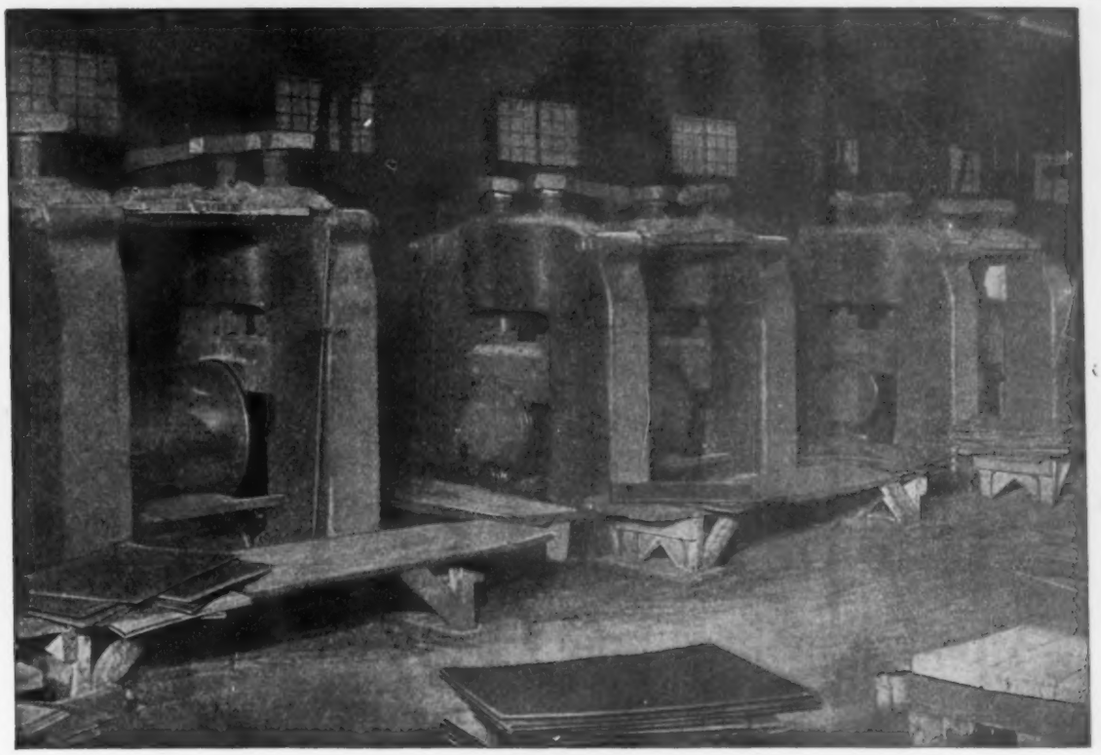
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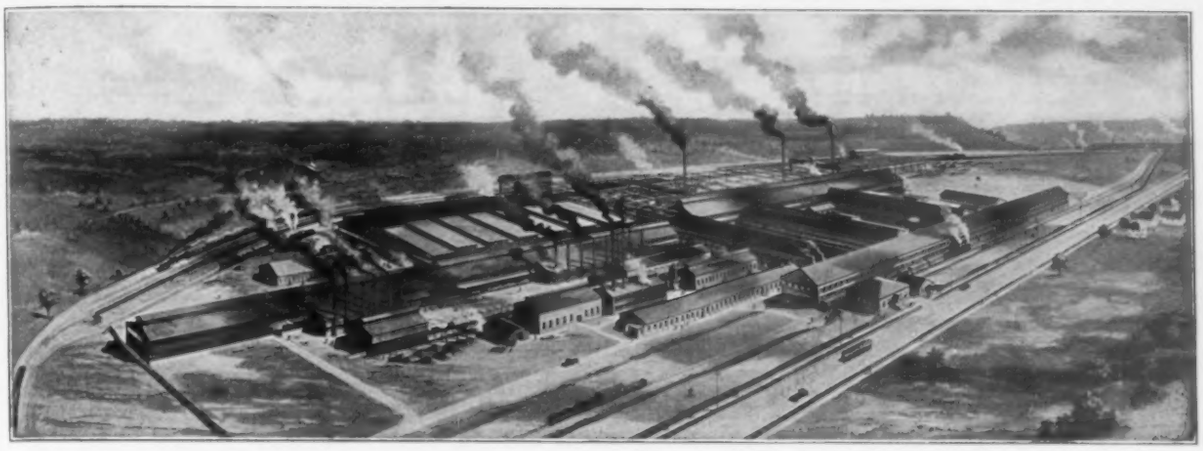
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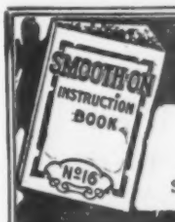
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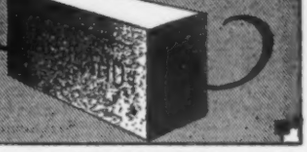
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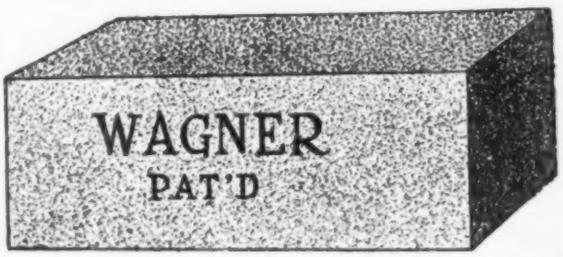
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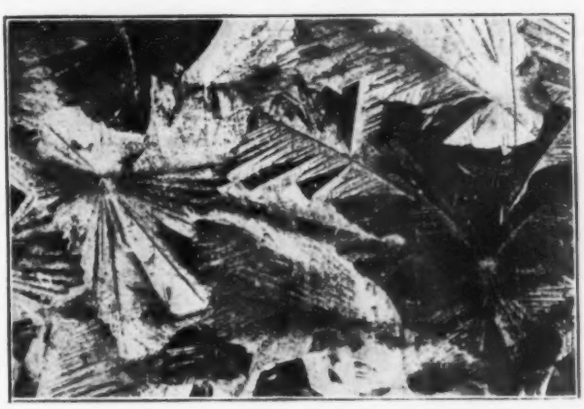
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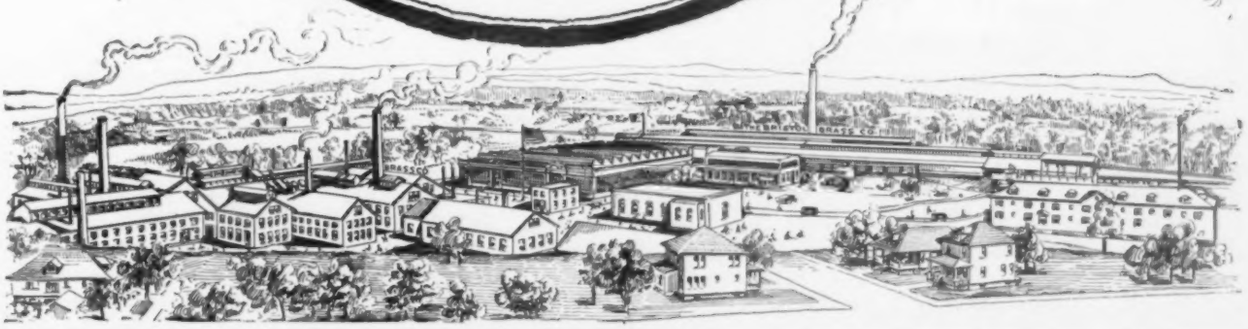
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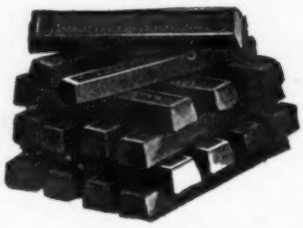
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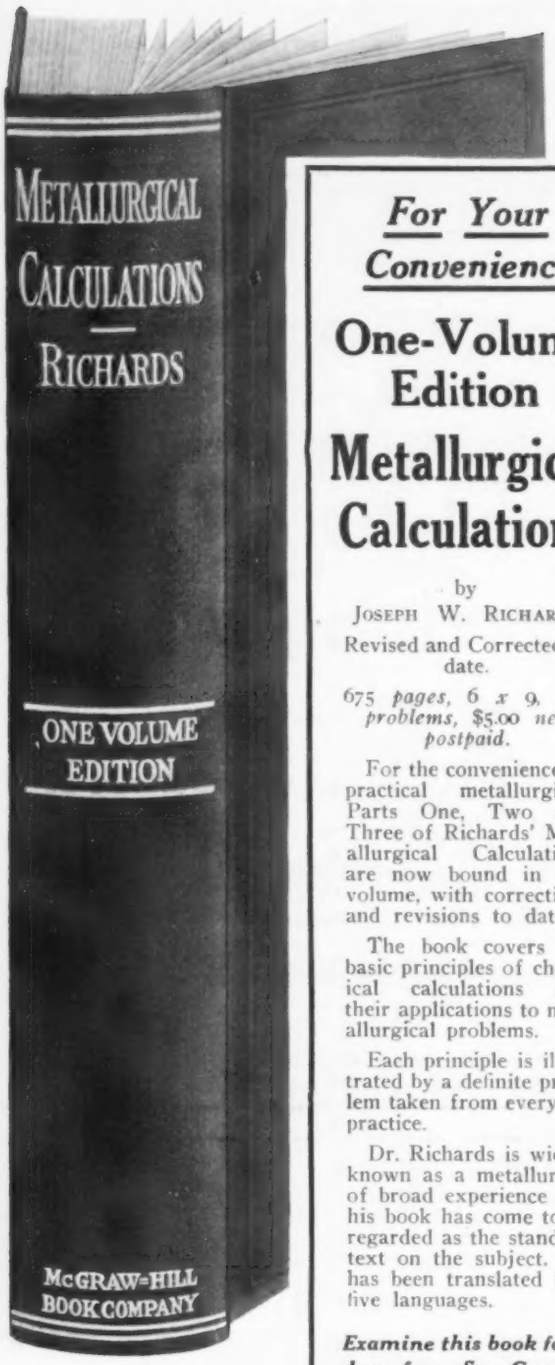
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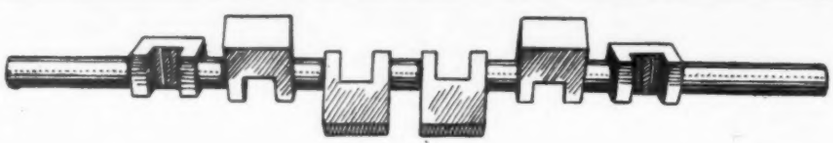
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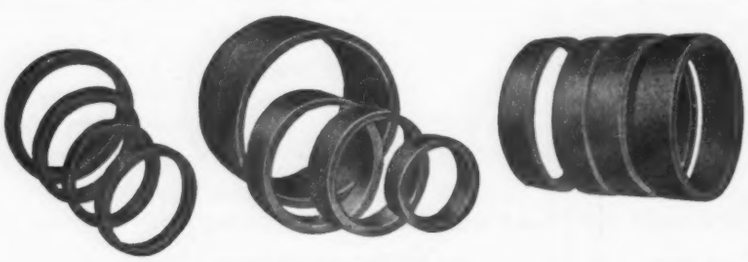




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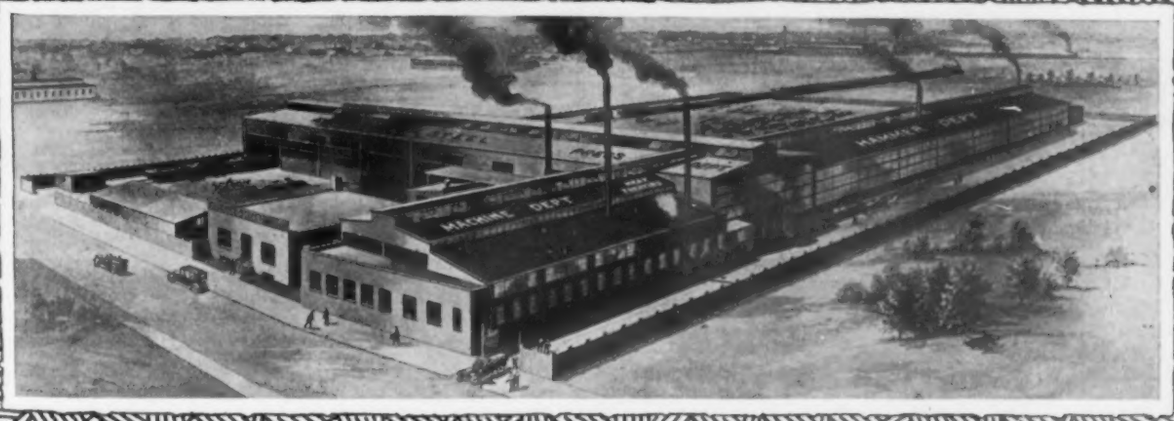
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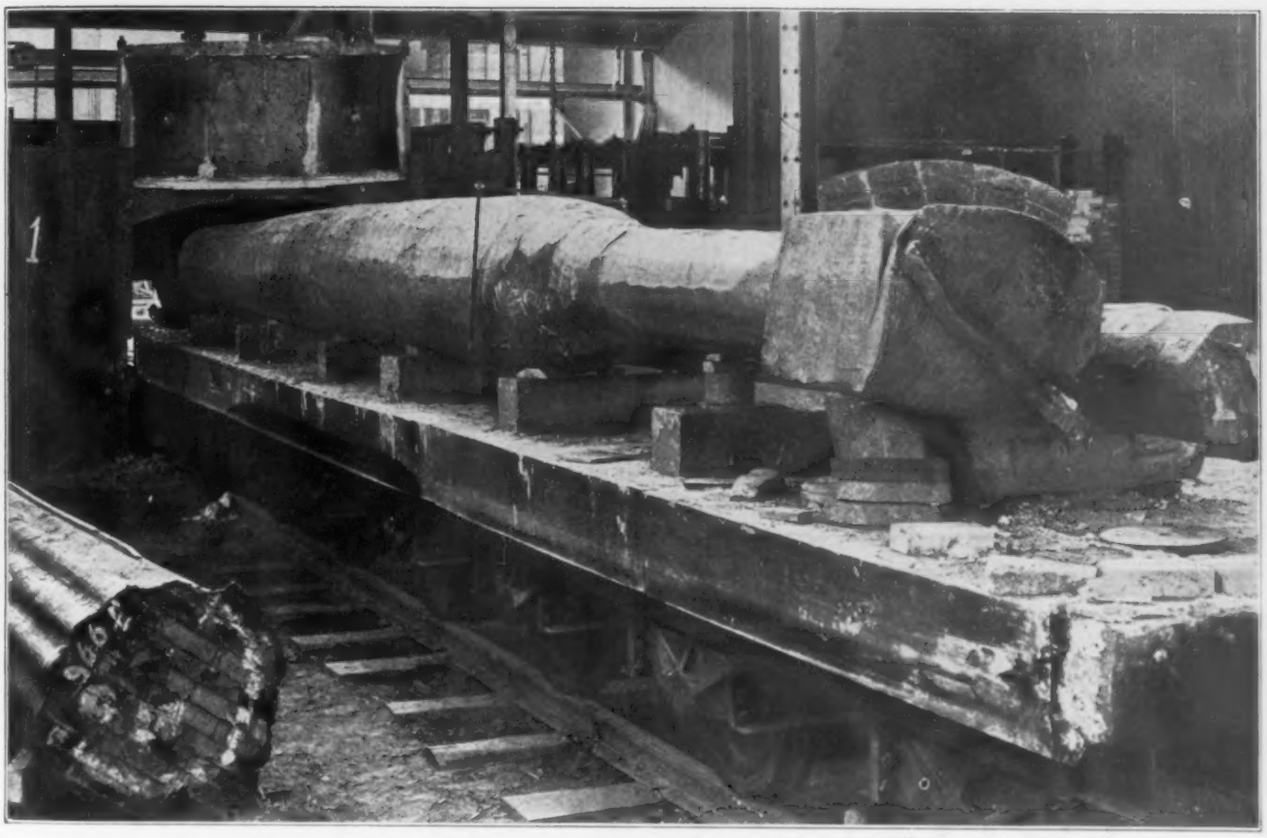
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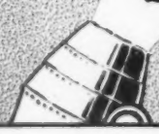
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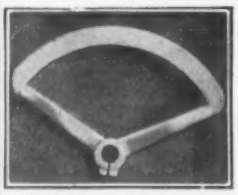
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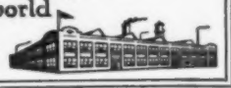
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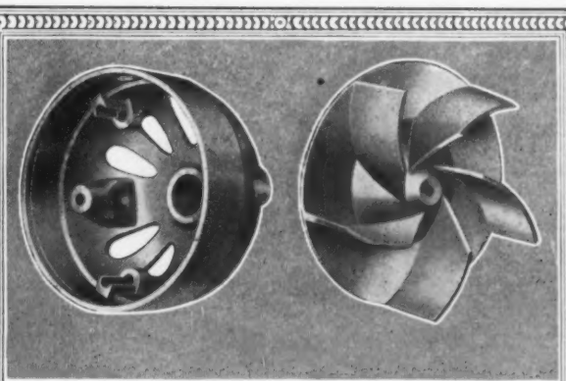
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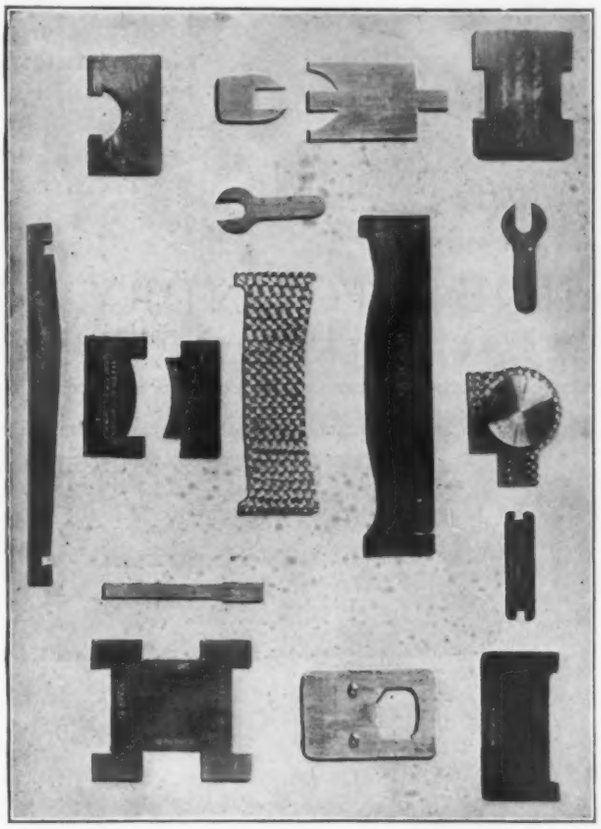
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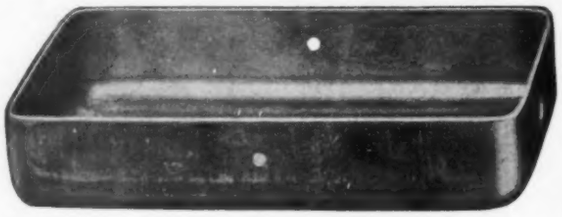
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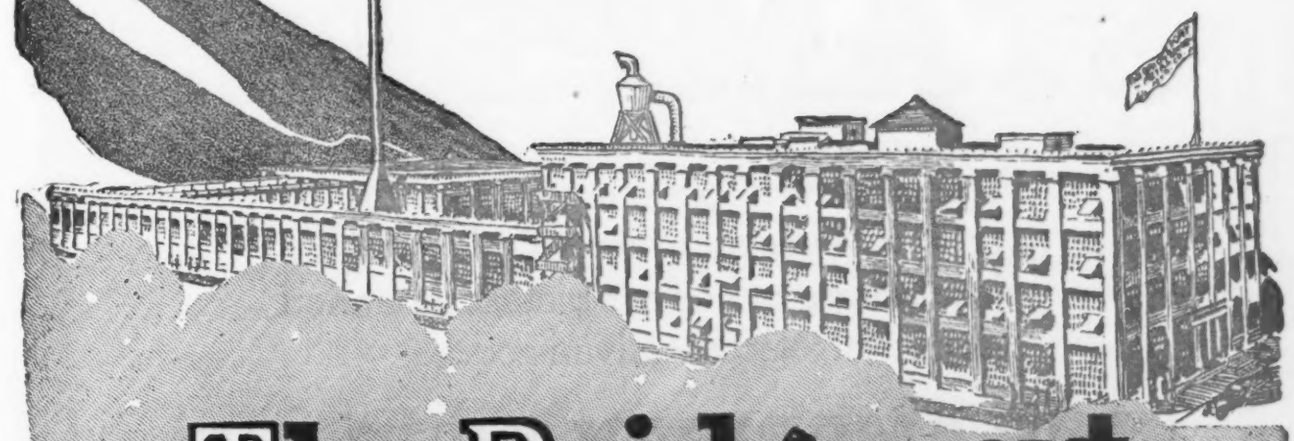
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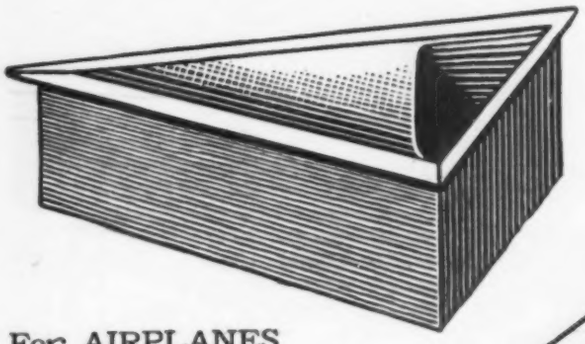
Our long and varied experience in the manufacture of brass parts, the fact that we make the raw material in our own mills, the class of engineers we employ, the care we take, the modern equipment we use, the rigid inspections —all these things help to make Bridgeport Brass parts the best that can be possibly secured anywhere at any price.

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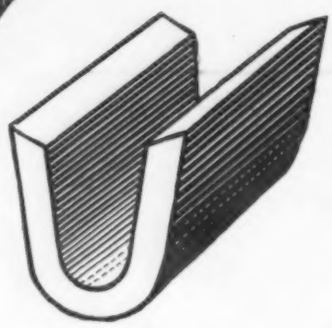
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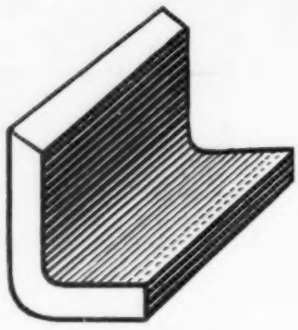
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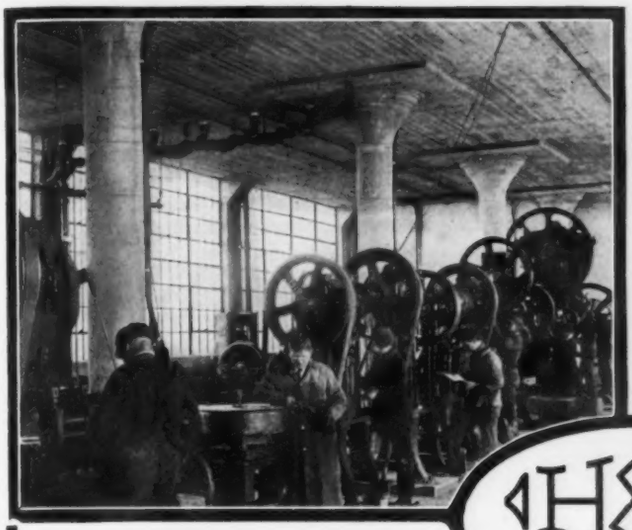
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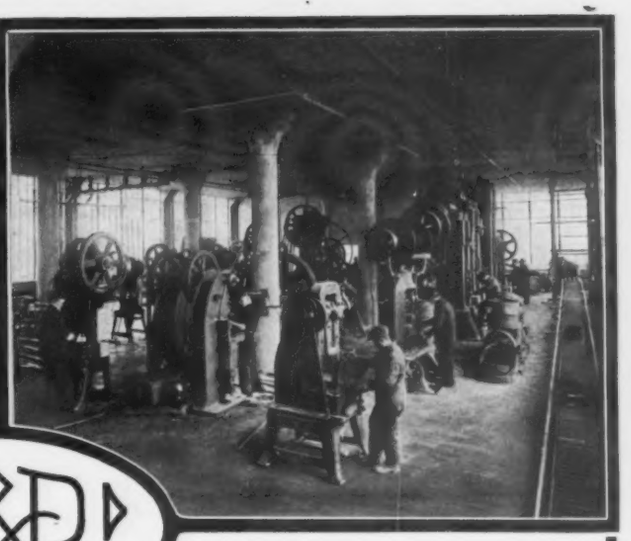


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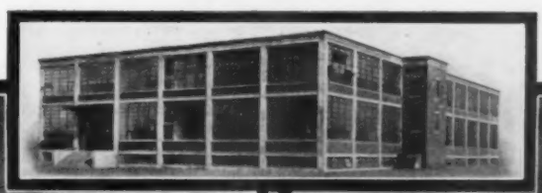
Stampings

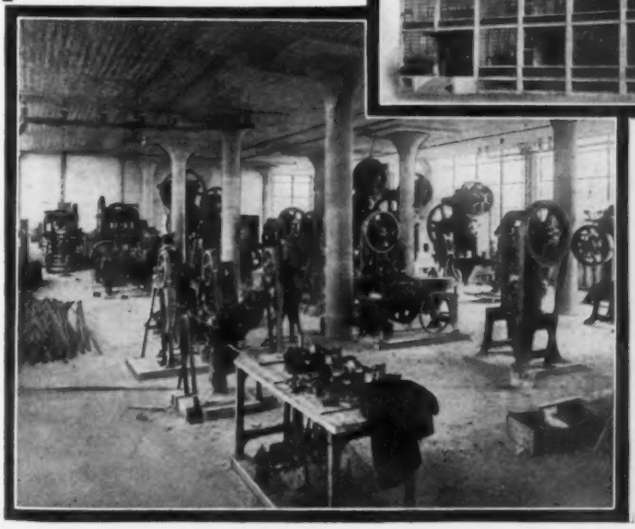
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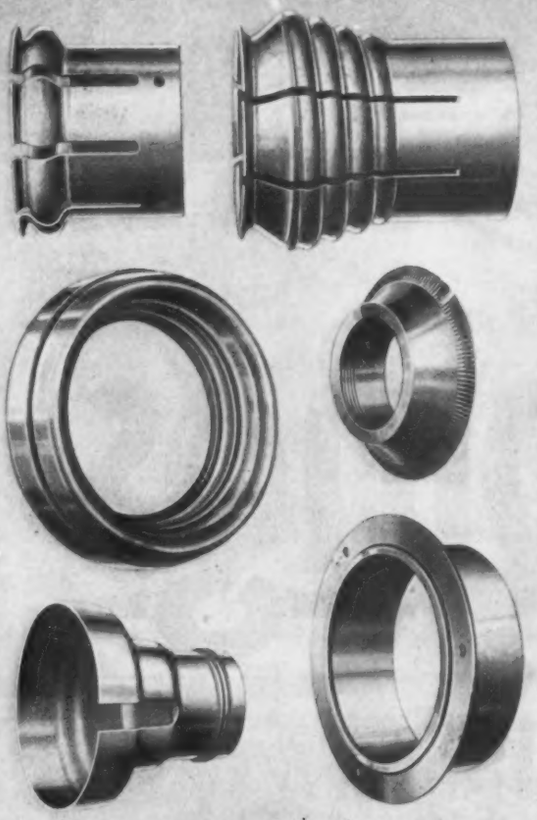




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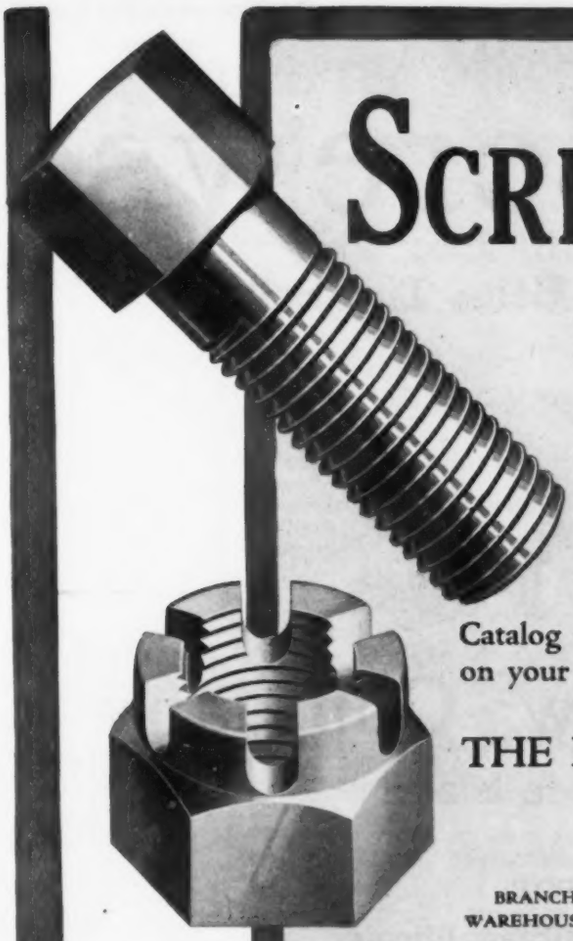
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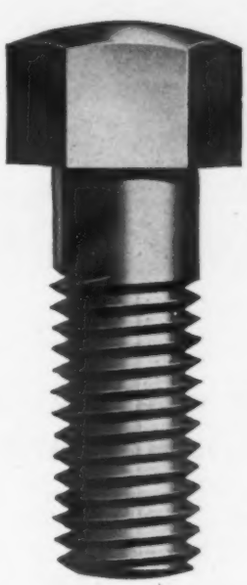
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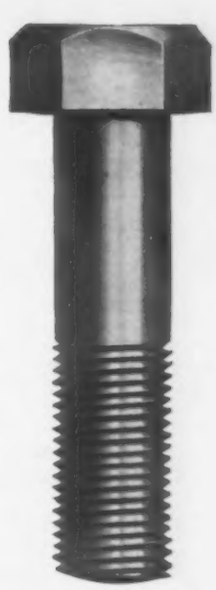
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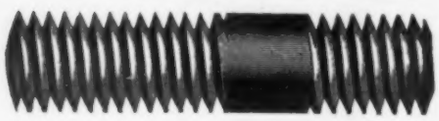
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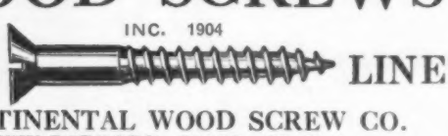
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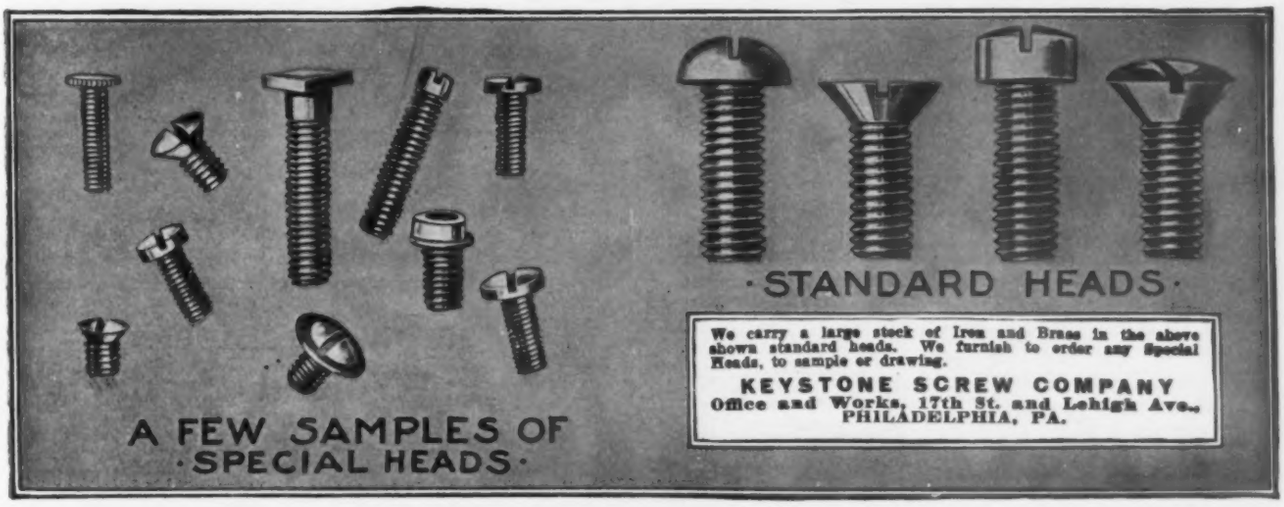
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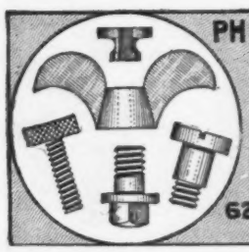
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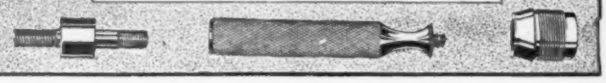


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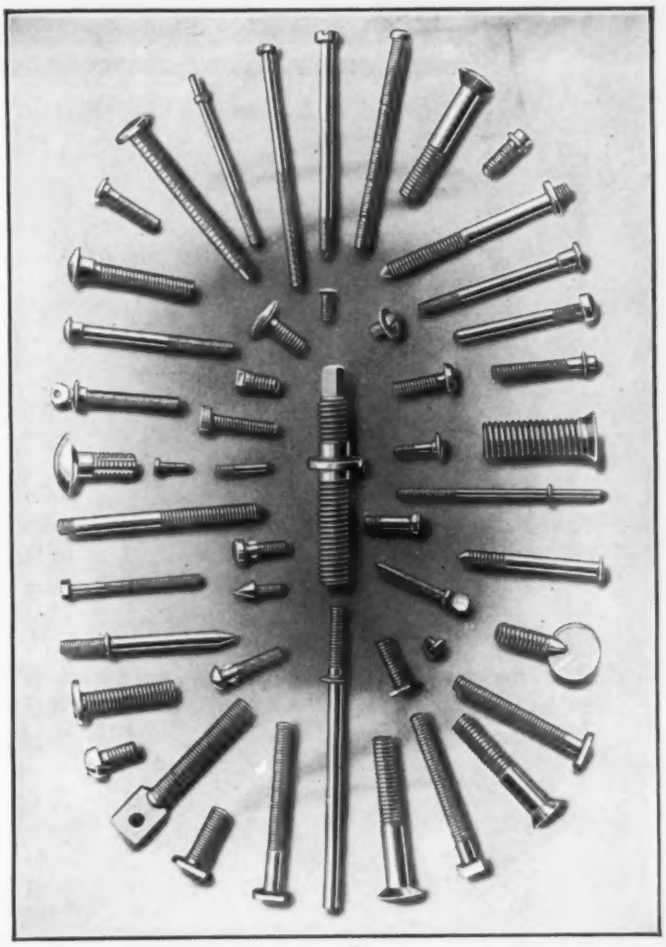


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Pattison St. and M. & P. R. R. YORK, PA.

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Successors to
The Critchley Machine Screw Co.
Screw Machine Products
WORCESTER, MASS.
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Screw Machine Products of Every Description—Milled from the Solid Bar
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The Quality Line

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Semi Finished	Nuts	Stove	Nuts
Cold Punched	Nuts	Wing	Nuts
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Round Head	Rivets	Coopers'	Rivets
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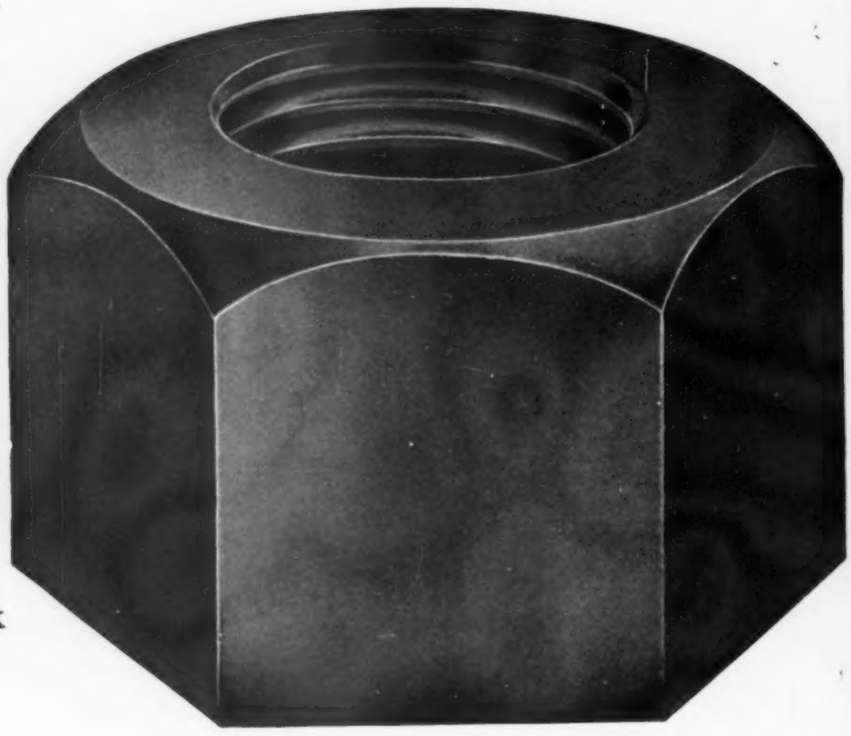
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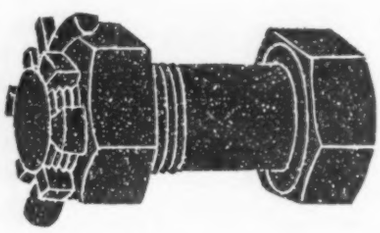
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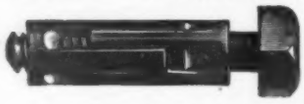


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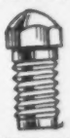
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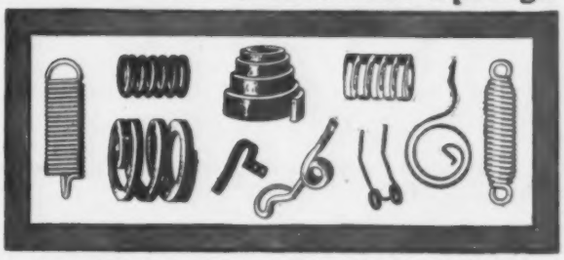
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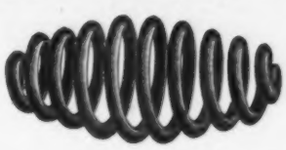
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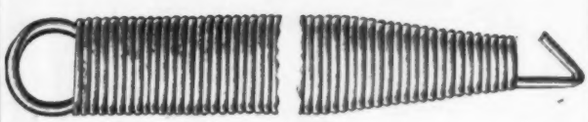


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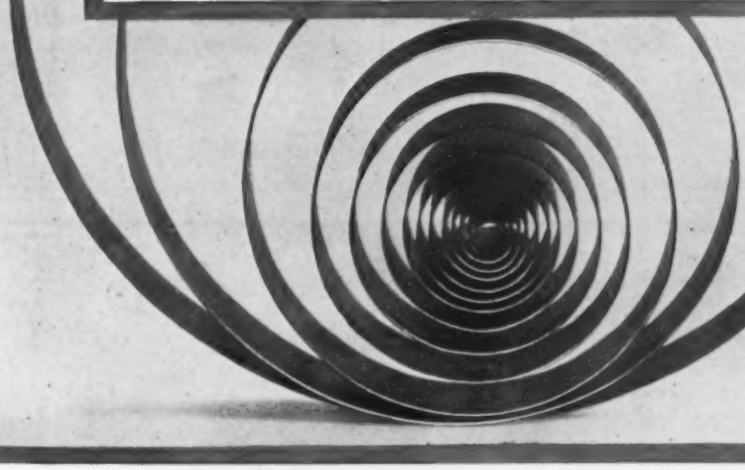
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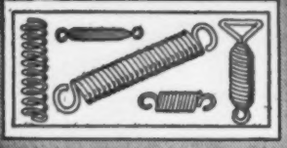
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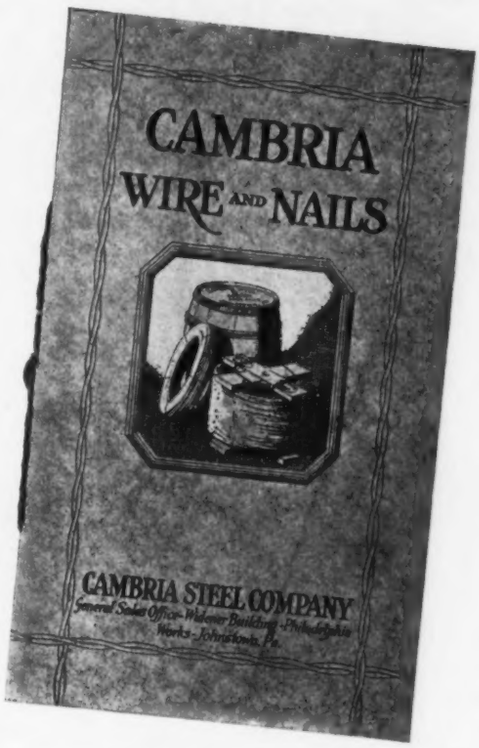
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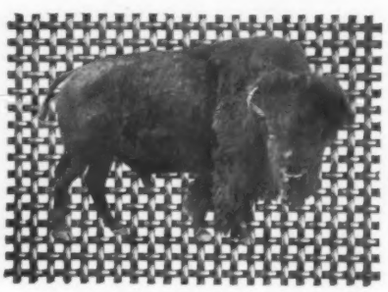
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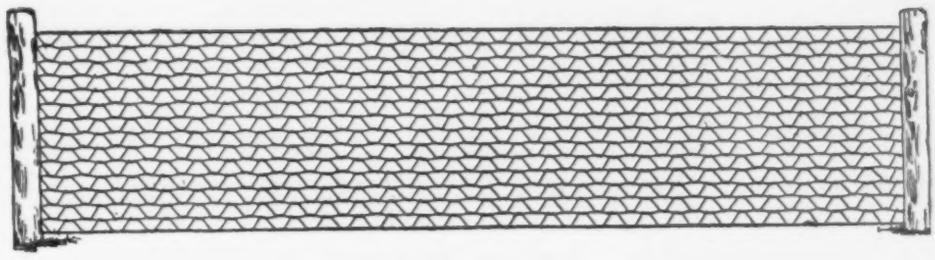
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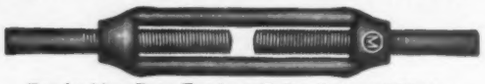
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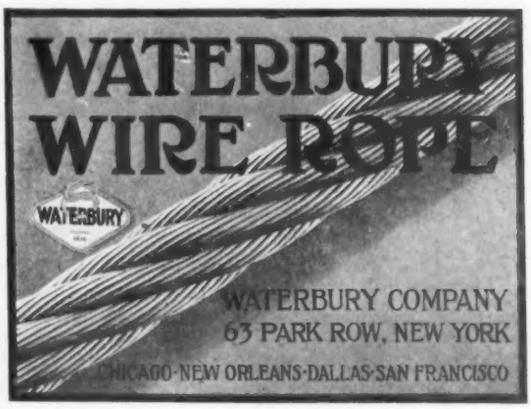
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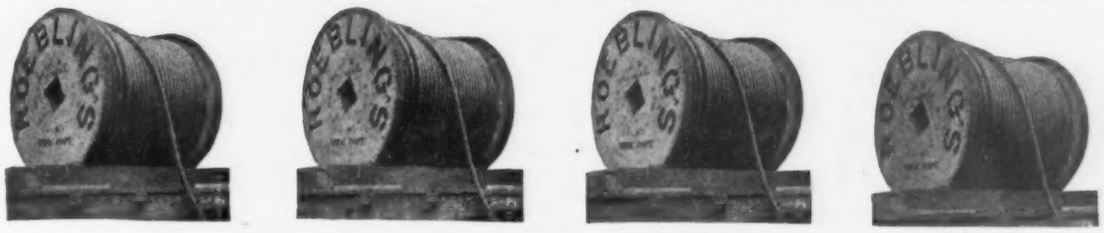
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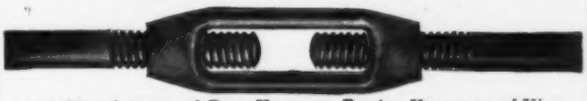


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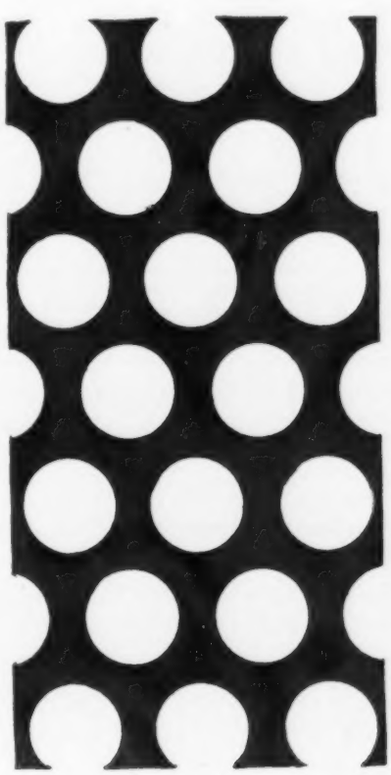
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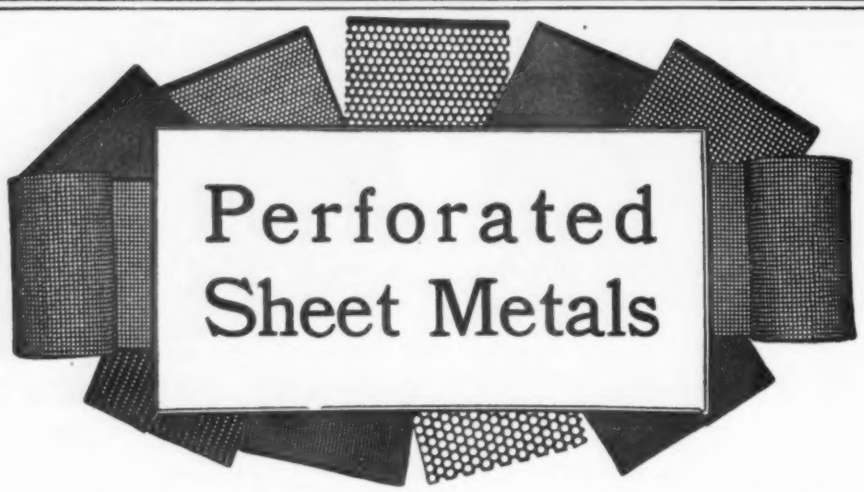


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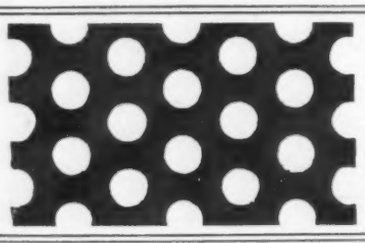
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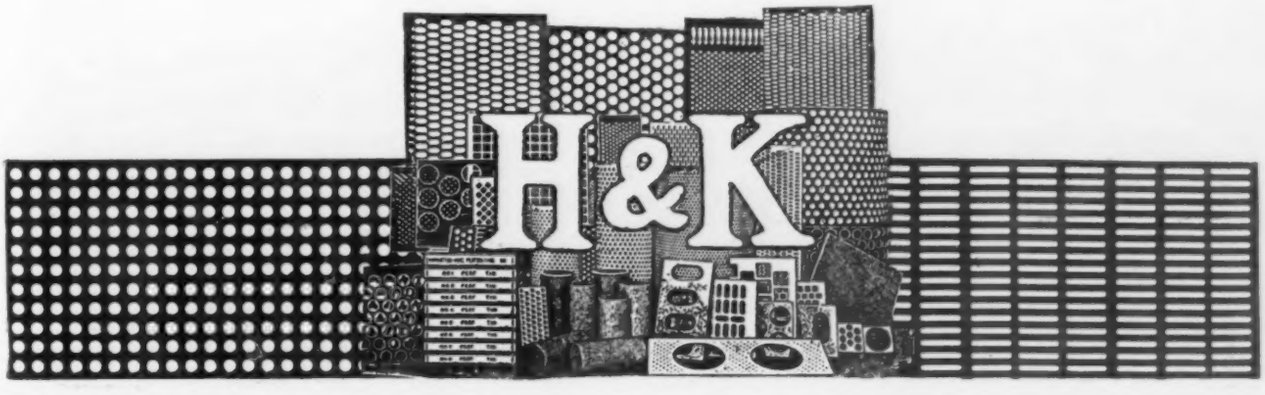
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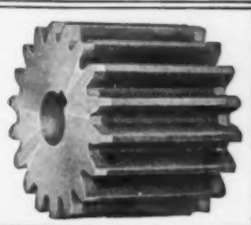
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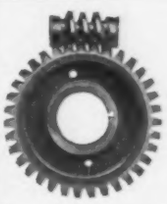
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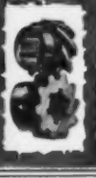
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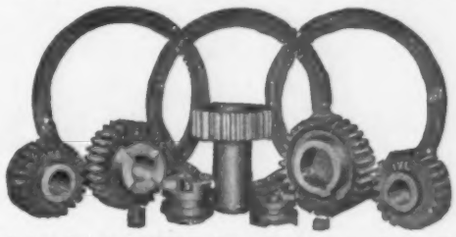
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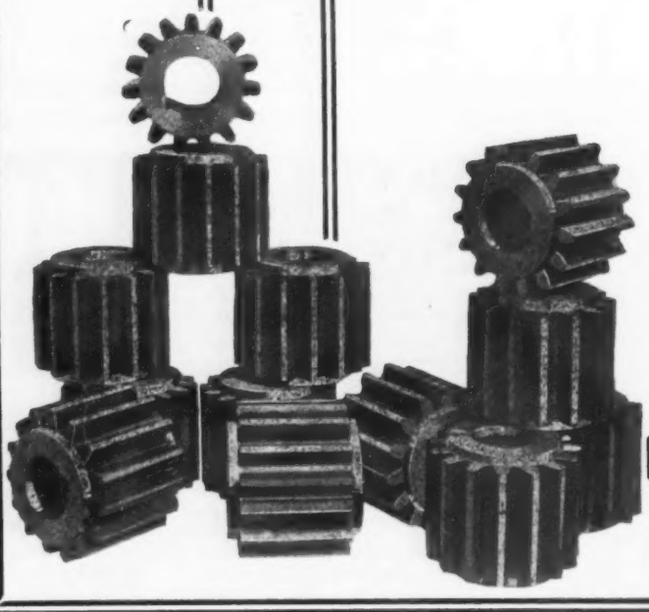
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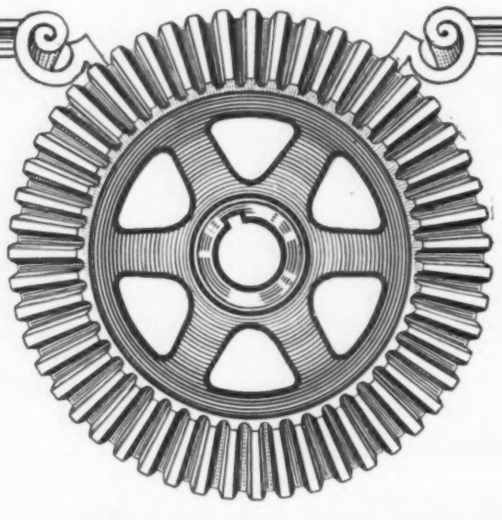


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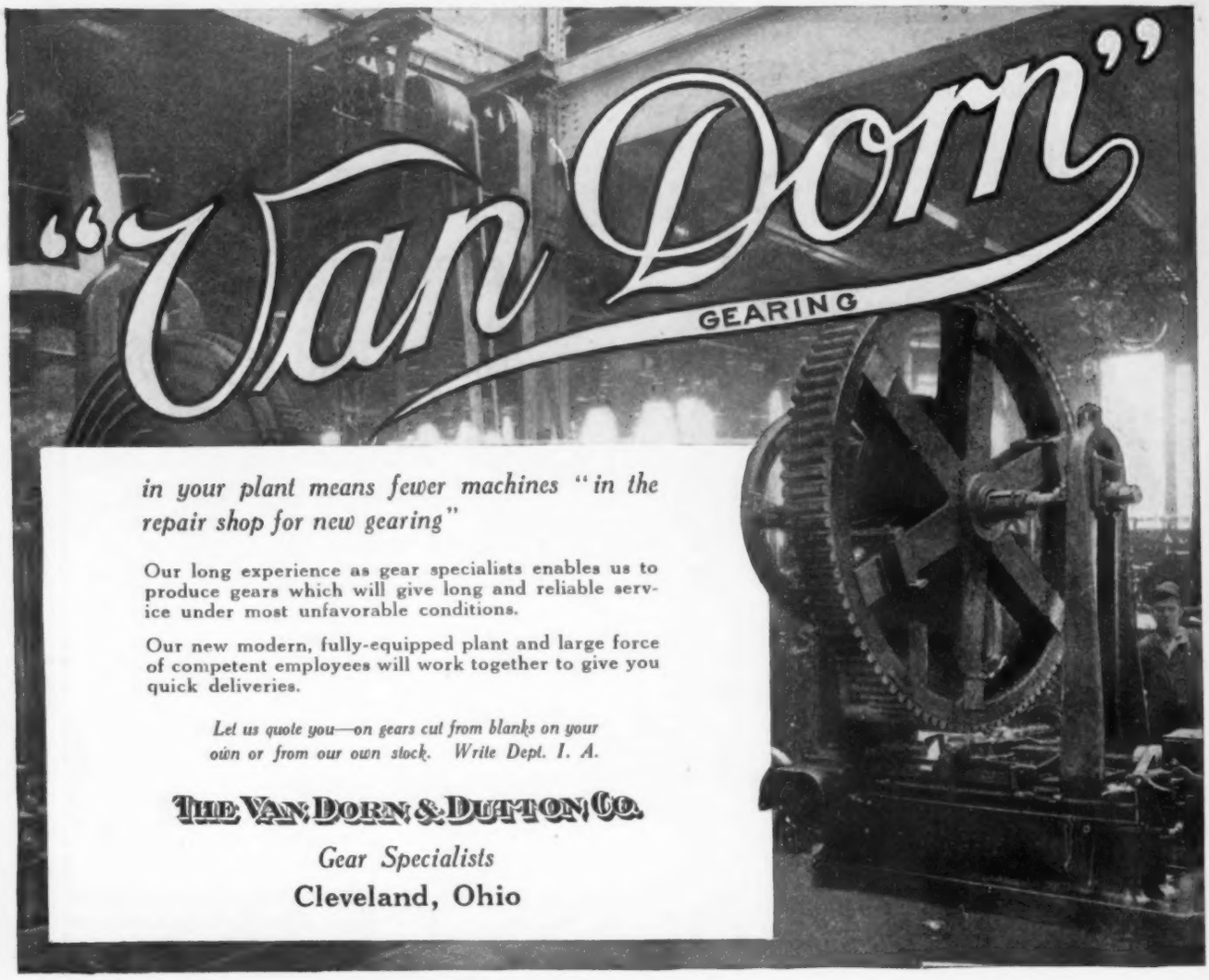
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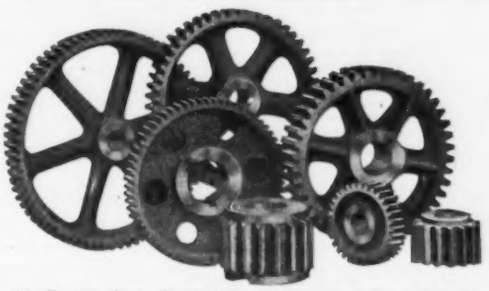
4,500,000 Motor Cars and Motor Trucks Carry Them

This number of passenger and commercial cars represents 95% of the total in North America.

The Hoover Steel Ball has, through force of merit, supplanted the high grade steel balls formerly supplied to the world only by Germany, and has brought supremacy in this industry back to the United States, where it originated.

The romance of the steel ball industry makes a deeply interesting tale of the triumph of American financial, industrial and scientific preparedness and progressiveness. This story, told in a book, "The Evolution of the Steel Ball Industry," will be sent on request.

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50% Greater Capacity



This is the result of three-point contact between the balls and raceways, instead of two.

This enables the bearing to sustain a thrust load equal to 50% of the rated radial capacity.

Other reasons why the Schatz bearings eliminate trouble will be found in our catalog.

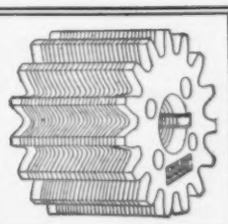
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Made promptly to any specification



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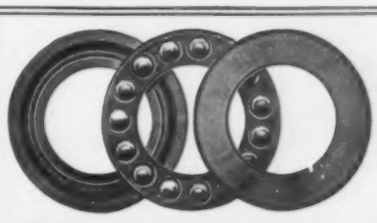
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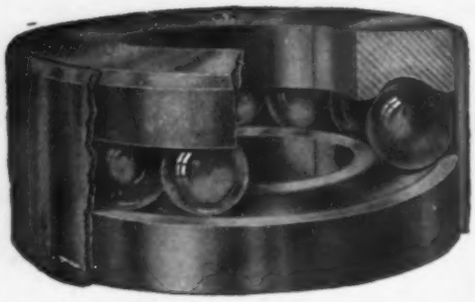
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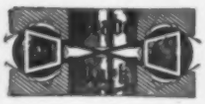


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for Steel Mill Equipment, Cranes, Trolleys, Hoists, Machine Tools, Trucks, Cars, Conveyors, Etc.





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CONRAD PATENT LICENSEE
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A HIGH-GRADE annular bearing that obviates the need for separate radial and thrust bearings. A single bearing carries both radial and thrust loads on a single row of balls. We call it the Gurney Radio-Thrust Bearing. Over half a million of these bearings are now giving satisfactory service. Further information on request.

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Your Bushing and Bearing Problems will be settled right, once and forever, if you use

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(Patented)

Scientific specializing for years has made the Bunting product the standard of quality.

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Any analysis and to your specifications
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Special Machine Work.

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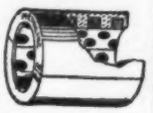


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They require **no oil for Lubrication,** thus insuring **Cleanliness** and obviating the **Fire Danger.**



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ELEPHANT BRAND

"Phosphor-Bronze."

"S" BEARING METAL

BUSHINGS

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for Bushings, Screws, Pinions, Pump Rods, etc.

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and other tempers.

SHEETS AND PLATES

For Fuller List See Last Issue.

All made under one brand.



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2200 WASHINGTON AVENUE PHILADELPHIA, PA.

SIZE OF CORES

OUTSIDE DIAMETER

1″	½″												
1⅛″	⅝″	½″											
1¼″	¾″	⅝″	½″										
1⅜″	⅞″	¾″	⅝″										
1½″	1″	⅞″	¾″	⅝″									
1⅝″	1⅛″	1″	⅞″	¾″	⅝″								
1¾″	1¼″	1⅛″	1″	⅞″	¾″	⅝″							
1⅞″		1¼″	1⅛″	1″	⅞″	¾″	⅝″						
2″		1⅜″	1¼″	1⅛″	1″	⅞″	¾″						
2⅛″		1½″	1⅜″	1¼″	1⅛″	1″	⅞″	¾″					
2¼″		1⅝″	1½″	1⅜″	1¼″	1⅛″	1″	⅞″					
2⅜″			1⅝″	1½″	1⅜″	1¼″	1⅛″	1″					
2½″			1¾″	1⅝″	1½″	1⅜″	1¼″	1⅛″					
2⅝″				1¾″	1⅝″	1½″	1⅜″	1¼″					
2¾″				1⅞″	1¾″	1⅝″	1½″	1⅜″					
2⅞″					1⅞″	1¾″	1⅝″	1½″					
3″					2″	1⅞″	1¾″	1⅝″	1½″	1⅜″			
3¼″					2¼″	2⅛″	2″	1⅞″	1¾″	1⅝″			
3½″					2½″	2⅜″	2¼″	2⅛″	2″	1⅞″	1¾″		
3¾″					2¾″	2⅝″	2½″	2⅜″	2¼″	2⅛″	2″		
4″					3″	2⅞″	2¾″	2⅝″	2½″	2⅜″	2¼″		
4¼″					3¼″		3″	2⅞″	2¾″	2⅝″	2½″		
4½″							3¼″		3″	2⅞″	2¾″		
4¾″							3½″		3¼″		3″	2¾″	
5″							3¾″		3½″		3¼″	3″	
5¼″							4″		3¾″		3½″	3¼″	
5½″							4¼″		4″		3¾″	3½″	
5¾″							4½″		4¼″		4″	3¾″	
6″							4¾″		4½″		4¼″	4″	

ALL CAST IN THE ROUGH 12″ LONG

¼″	5/16″	⅜″	7/16″	½″	9/16″	⅝″	11/16″	¾″	13/16″	⅞″	1″		

THICKNESS OF WALLS

SOLID CASTINGS

½″ to 4″ DIAMETERS CARRIED IN STOCK

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—Just Bushings

of every type and size—but bushings that are *better*—made by specialists in a new plant specially erected and equipped for the purpose—one of the largest exclusive bushing factories in the world.

We believe we can fill your bushing requirements to better advantage.

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Send blue prints and specifications to Dept. I A for quotations.

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ALLOYS THAT WILL ALWAYS BE FOUND AS REPRESENTED

It has established confidence for our products in the

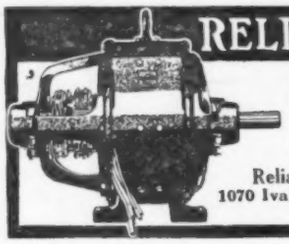
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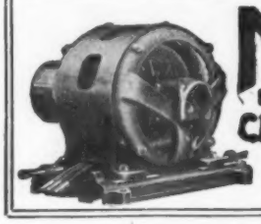
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DIRECT CURRENT
MOTORS
FOR EVERY REQUIREMENT
ELECTRO DYNAMIC CO.
BAYONNE, N. J.



RELIANCE MOTORS



Type T Reliance Motors represent the combined experience of thirty-five electrical engineers in the large steel mills and machine shops.
For details see Bulletin 2014.
Reliance Electric & Engineering Co.
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MOTORS
Like the Pyramids, built to last
CROCKER-WHEELER CO
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They Seldom Need Repairs
Because they have automatic Ring-Oiling lubrication which cuts out excessive wear.
USE **MULE-PULL CLUTCHES**
SEND FOR CIRCULAR
BROWN ENGINEERING COMPANY
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Safeguard Your Lighting System

The Knife Switches used on the ordinary panel board are dangerous. Protect your employees by using—

KRANTZ
Safety Panel Boards

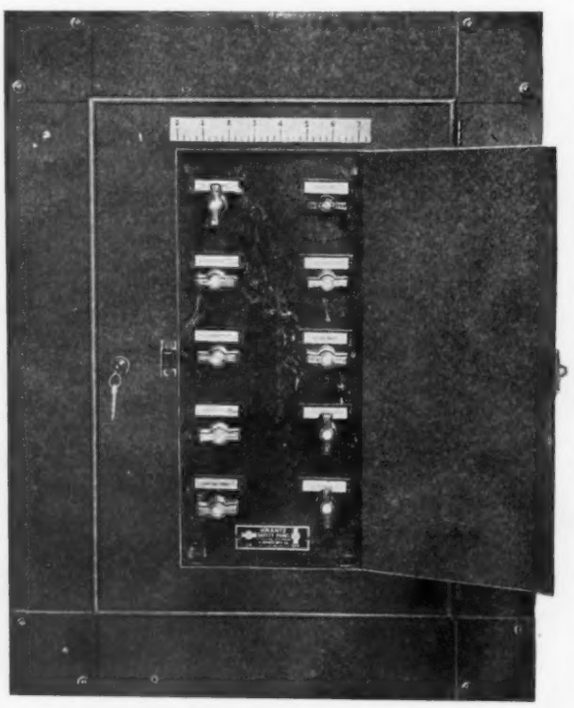
W
WESTINGHOUSE ELECTRIC

The lights can be turned on and off without the slightest possibility of contact with live parts. The fuses are locked beneath the second door, and are reached only by authorized persons.

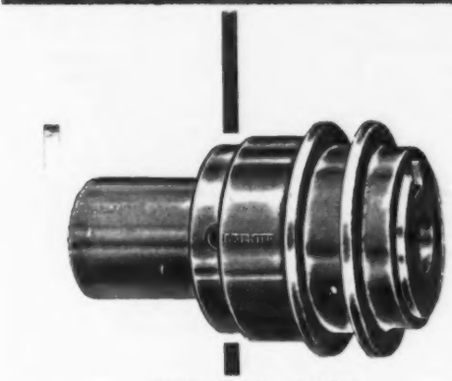
Besides being safe, these boards are very handsome in appearance and are an ornament to the building, not an eyesore.

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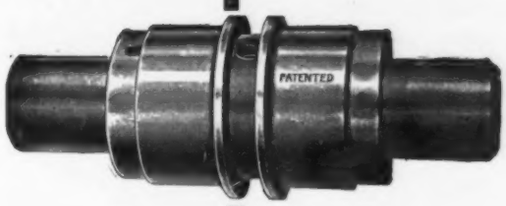
Westinghouse Electric & Mfg. Co.
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THE JOHNSON FRICTION CLUTCH



Single Clutch—exterior



Double Clutch—exterior

Easily Modified to Meet Special Requirements

What the manufacturers of machines and machine tools appreciate is that the JOHNSON FRICTION CLUTCH may be incorporated in their machines without altering the design or construction.

There are numerous cases where JOHNSON FRICTION CLUTCHES are replacing other methods of machine operation. The double clutch in particular is being used in various ways on machine tools where a reversing mechanism is required.

Send for the booklet of valuable information on "Clutches As Applied in Machine Building" and our

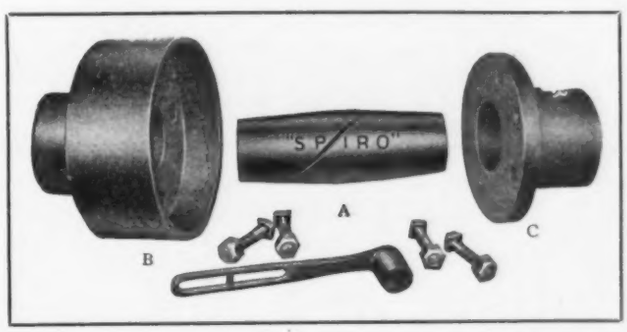
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"Spiro" The Coupling Without A Fault



It grips the shaft 50% tighter than any other compression coupling made, thereby making your shafts as strong as one continuous piece.

Its convenience is appreciated when you wish to remove a section of the line shaft quickly. All you have to do is loosen the four bolts and slide the shafting out, no trouble, no time wasted. This coupling will not slip or loosen and has no keys to break or work loose. "Spiro" is *the* efficient coupling.

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FRICTION CLUTCH PULLEY

ESTABLISHED 1864

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ENGINEERS FOUNDERS MACHINISTS AND MILLWRIGHTS

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MANUFACTURERS OF

FRICTION CLUTCH PULLEYS, CAST IRON SPLIT PULLEYS
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WE DESIGN, BUILD AND ERECT

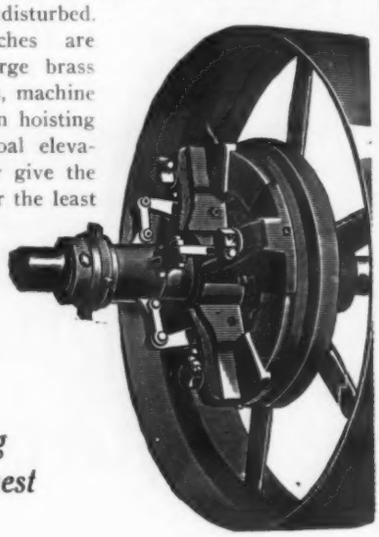
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GREY IRON CASTINGS, SMALL AND UP TO 25 TONS
SPECIAL HEAVY MACHINERY BUILT TO ORDER

WORKS—ELIZABETHPORT, N. J.

Operate Your Machines Independently

"Frisbie" Clutches permit your men to operate their machines independently. This feature is particularly appreciated when a machine on a shaft line containing eight or ten machines breaks down. While it is being repaired the production of the other machines goes on undisturbed.

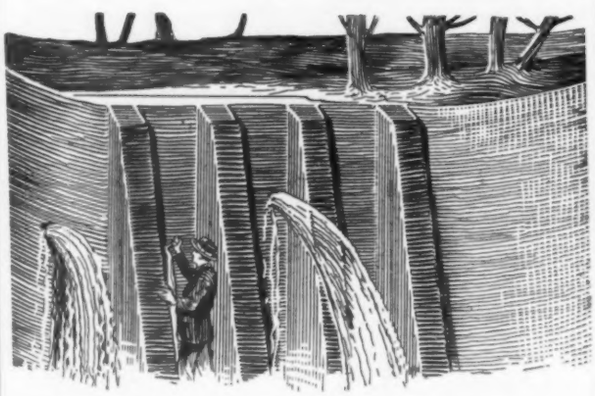
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Are you working all day and figuring all night on means and methods of clipping a few cents here and there from your operating costs? While at the same time there's a great big leak eating up all the savings you have effected by such careful watch over your end of the plant

The big leak is a result of supplying power to machinery that is not in use. It costs almost as much to drive an idle machine as it does to drive one that is in use. And besides, it's not good for any machine to run all the time.

It isn't necessary either. Moore & White Friction Clutches will plug the leak through which the power goes to waste. When a machine isn't needed it can be cut off. And in case of accident a pull on the lever of the M & W Friction Clutch may save a life.

Write for our new Catalog "A"

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Friction Clutch Pulleys or Couplings

If you use pulleys for transmitting power, our Pulley Catalogue will interest you. So will our prices. Better inquire. We specialize on Friction Clutch Pulleys, also Friction Clutch Cut-Out Couplings. Can also furnish plain cast iron pulleys and shafting hangers.

Our type of Friction Clutch can be attached to the hub of your own pulley, gear or sprocket. Successfully made for 25 years.

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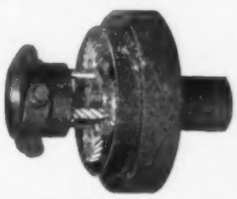


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Modern and Approved Appliances for the Transmission of Power.

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CLUTCHES for all purposes

Quick shipments from large finished stock.

Hilliard Clutch & Machinery Co.
ELMIRA, N. Y.

A Profitable Challenge for YOU.

If you use machinery, direct driven or from a line shaft, you can save money, trouble, shutdowns and damage to your machinery by using **CLARK FLEXIBLE COUPLINGS**

This statement is based on data and proofs gathered during years of satisfactory service to thousands of machinery users, including the best known plants in the country.
Let us prove it to YOUR advantage. It will pay you to write us today.

I. H. DEXTER CO., INC.
Flexible Couplings
27 Walker Street New York
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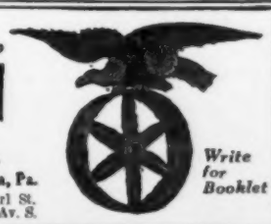
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We make a complete line of Power Transmitting Machinery, Shafting, Rope Transmission, Machine Moulded Iron and Steel Gears for heavy service.

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For great durability high speeds and minimum belt slip

AMERICAN STEEL SPLIT PULLEYS



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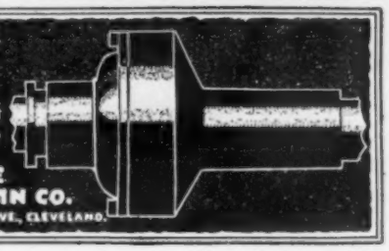
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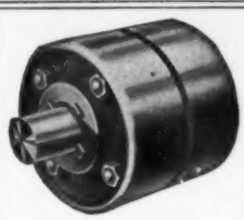
Transmission Machinery for Belt and Rope Distribution

Falls Clutch & Machinery Company
ENGINEERS—FOUNDERS—MACHINISTS
CUYAHOGA FALLS, OHIO, U. S. A.
New York 206 Fulton Street | Boston 52 Purchase Street | Cincinnati, O. 214 Elm Street

USE CLEVELAND CLUTCHES FOR ALL TRANSMISSION REQUIREMENTS



THE RELIANCE GAUGE COLUMN CO.
6004 CARNEGIE AVE., CLEVELAND.



THIS coupling excels in *grip*. The harder the twist-strain on the shaft, the tighter this grip becomes. The coupling simply *has* to hold.

We want you to know just "how" and "why" the four tapered, wedge-like jaws of "Nicholson" Couplings virtually weld the shafting ends together. There is a place in your plant where "Nicholsons" can go to work. We will send you one for 30 days trial and ask nothing of you, but to give it a fair chance.

Now is a good time to write us.

NICHOLSON COMPRESSION SHAFT COUPLING

W. H. NICHOLSON & CO.
115 Oregon Street, Wilkes-Barre, Pa.

SPARTAN BELTING

Unaffected by steam, water, snow, gas, acid fumes and sudden changes of temperature. Send for Spartan Booklet No. 14.

Graton & Knight Mfg. Co., 368 FRANKLIN ST. WORCESTER, MASS

WHITE STRIP

A patented composite belt that has demonstrated its ability to last two, three, even five times as long as best regular belting. Write for further particulars.

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SIDE GUIDE & GRIPPER

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"TEST SPECIAL"
Rubber Belt



Production Without Interruption

How much of your effort is wasted because of belting troubles?

There is no necessity for the constant adjusting, repairing and replacing of belts that slip and break.

Your machines can be equipped with "TEST SPECIAL" Rubber Belting at moderate cost (much less than leather). It is a belting that does not slip, cannot stretch and gives an uninterrupted service.

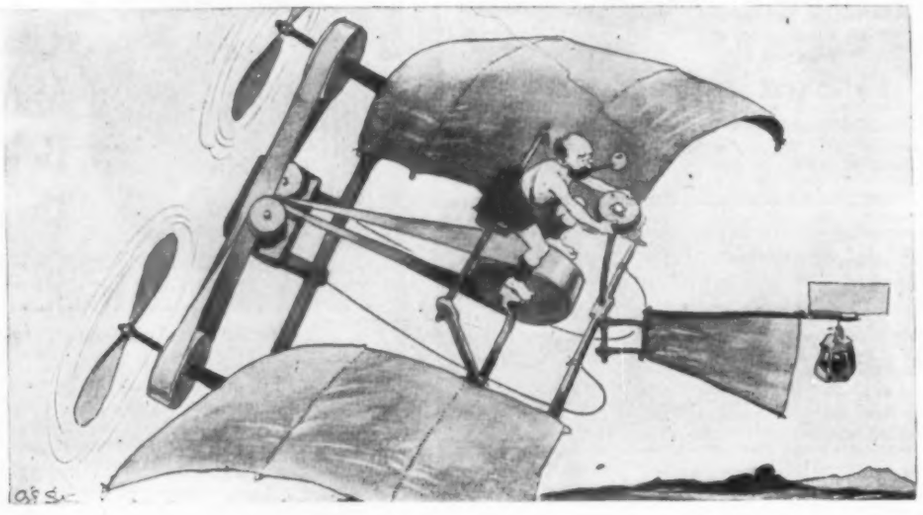
We manufacture belting for all classes of service, not only for general power transmission, such as Main Engine Drives, Counter Shafting, High Speed Machinery, Saw and Paper Mill Service, but for Elevators, Conveyors, Belts with reinforced covers and Belts for exposed or outside work.

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ST. LOUIS, MO.....218-220 Chestnut St.
PHILADELPHIA, PA.....821-823 Arch St.
SAN FRANCISCO, CAL.....519 Mission St.
BOSTON, MASS.....65 Pearl St.
PITTSBURGH, PA.....430 First Ave.

The Solid Woven Cotton Belting



"STANLEY"—Driving a Monoplane

Aviation is like a deadly poison—one drop and you're dead. But nothing ever happens with STANLEY as the pilot. He's never "fallen down" yet.

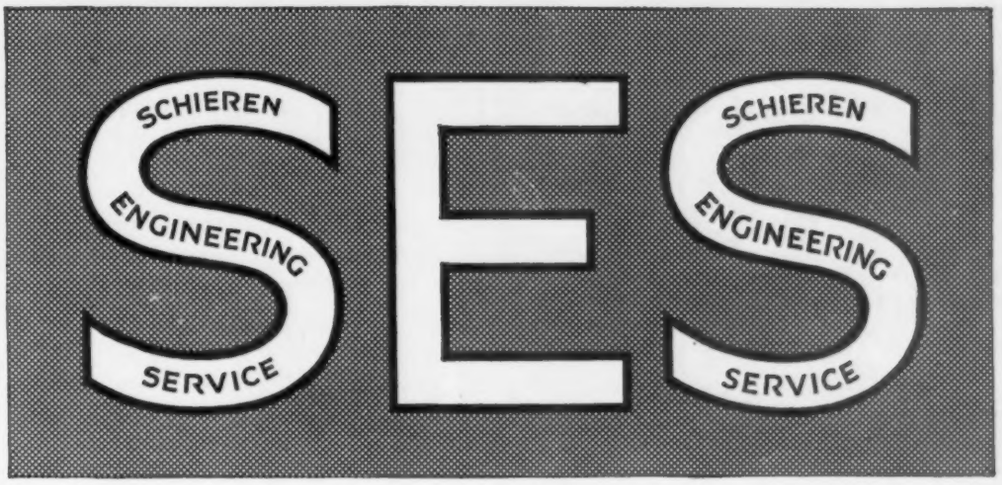
Put STANLEY to work any place—in extremes of temperature, where dampness, dirt and acid fumes are prevalent—he's right in his element.

Surely you want to test his mettle on that difficult belting drive of yours.

STANLEY BELTING CORPORATION

32-40 S. Clinton St. **Chicago, Ill.**

"Adds nothing to the price—reduces the cost"



— commences with the tannage of the raw hides by a process acknowledged to be best for belting purposes;

— continues through all of the different steps in manufacture;

— assures proper application according to good mechanical practice; and,

— ends only after the belt has given satisfactory service over such a period of time as will make its purchase and use economical to the buyer.

For Particulars Address: "S. E. S. Dept."

DUXBAK BELTING
TRADE MARK
Reg. U. S. Pat. Off.

Chas. A. Schieren Company
ESTABLISHED 1850
TANNERS
BELT MANUFACTURERS
SCHIEREN BUILDING, NEW YORK

LADEW LEATHER BELTING

THE PERFECT BELT
HOYT'S TURTLE
LEATHER
WATERPROOF BELTING

OUR FIELD
HOYT BELTING
Edw. R. LADEW Co. Inc.
GLEN COVE, NEW YORK U.S.A.
TRADE MARK

THE best leather obtainable, plus the waterproof quality which Nature neglected to provide—that is **"Turtle."** Can anything more be asked in a leather belt? The quality of **"Turtle"** long since ceased to be a mere matter of manufacturers' claims. It is written in the record of experience. There is no better waterproof leather belt than **"Turtle."** Many users go so far as to say that there is none so good. Its record commands your confidence.

BELTING
EDW. R. LADEW CO., INC.
GLEN COVE, NEW YORK, U.S.A.

THERE'S neither profit nor pleasure in doing twice what need be done but once. A belt joined with

CRESCENT BELT FASTENERS is joined to stay.





Ask our Service Department

CRESCENT BELT FASTENER COMPANY
381 Fourth Avenue New York, U. S. A.

Divergent



Saw Edge Fasteners

CORRUGATED FASTENERS

MANUFACTURED BY
Acme Steel Goods Company
2834-40 Archer Avenue, CHICAGO, ILL.

Morton's Cable Chains

BRONZE AND STEEL

For hanging sash and suspending doors, gates, weights, etc. Very easy to apply. Strong and durable. Some have been in use over 25 years.

Thomas Morton, 245 Centre St., New York

Diamond Chains

Hundreds of Diamond Chains in as many factories are daily transmitting thousands of horsepower under varying conditions—giving greater economy, greater efficiency; saving time, space and power.

Write for illustrated catalogue.

DIAMOND CHAIN & MFG. CO.
Indianapolis, Indiana

WHITNEY DRIVING CHAINS

For Power Transmission



USED BY THE LEADERS
THE WHITNEY MFG. CO. Hartford, Conn.

TESTED CHAINS ONLY

BRADLEE & CO.

Empire Chain Works Beach St. and East Susquehanna Ave., Philadelphia

Sole Manufacturers of the D. B. G. Special Crane Chain. Chains for Foundry Cranes and Slings. Steel and Iron Dredging, Slope and Mining Chains. Ship's Cables and Marine Railway Chains

SPROCKET CHAINS

Riveted or Detachable

The ever increasing demand for our Standard Detachable Sprocket Chains is sufficient evidence that they are giving unfailing service.

Wherever our chains are used there has been a considerable reduction in upkeep costs and practically no loss of time in making repairs, the chains being detachable at any point.

There's a chain for any size sprocket. Refer to our catalog.

The STOWELL COMPANY

FOUNDERS AND MANUFACTURERS

SOUTH MILWAUKEE, WISCONSIN



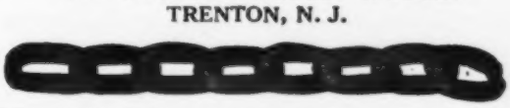
When You Buy Dredge Chain

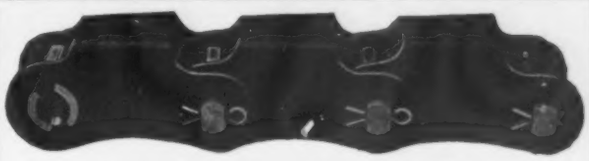
look for the name *Woodhouse Trenton* stamped on every six-foot section. It's a guarantee of quality and a sign of the faith we have in it. Made of chemically selected pure pig iron, treble worked and rerolled.

The cut shows a section of chain as originally furnished and as worn and stretched after 16 *months' continuous work in the hardest kind of rock*. The chain is still in use. Compare this with the chains you have used.

Write for catalogue and pamphlet of testimonials.

WOODHOUSE CHAIN WORKS
TRENTON, N. J.





"The Chain of Double Life"

Fits Cut and Std. C. I. Sprockets 1 to 12 in. pitch.

Union Steel Rivetless Chains

High Carbon Links (STRENGTH), Large Glass-Hard, Reversible Bearings (DURABILITY), One-Piece Rivetless Construction (PERMANENCY) insure **Trouble-Proof Money-Saving Service.** Bushing Chains, Roller Chains, Attachment Links, Buckets, Sprockets, Elevators, Conveyors, etc.

THE UNION CHAIN & MFG. CO., Seville, Ohio

30 Church St., New York Tel. Cortlandt 892
Chicago, 565 Washington Blvd. Buffalo, 716 Marine Bank Bldg.
Knoxville, Bank & Trust Bldg.

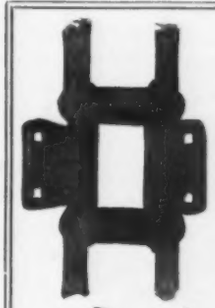
CHAIN

For all industrial uses
Quality the best
Deliveries prompt

The Columbus McKinnon Chain Co.

Columbus, Ohio

New York City 30 Church Street
Telephone: Cortlandt 3017



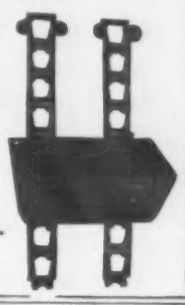
CHAINS

For Handling Gritty Material

COKE, COAL, SAND, ORE, STONE, SCALE

Made of Malleable Iron or Steel

Chilled Rim Sprocket Wheels



H. W. Caldwell & Son Co.

Chicago: 17th Street and Western Ave.
New York: 50 Church Street
Dallas, Texas, 711 Main Street

Baldwin
Chains and Sprockets
Baldwin Chain & Mfg. Co., Worcester, Mass.

AMERICAN CHAIN COMPANY
INCORPORATED
BRIDGEPORT, CONN., U. S. A.
LARGEST CHAIN MANUFACTURERS IN THE WORLD

Haiss Digging Wagon Loader
PATENTED
Saves 10 Cents a Yard
on all material handled with it



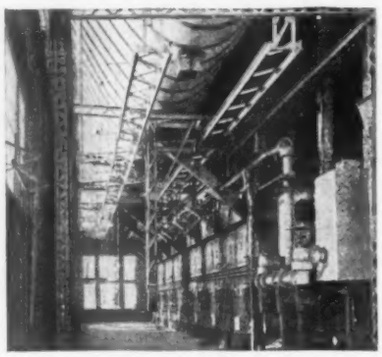
Used By Winchester Repeating Arms Co.
Swift & Co-National Tube Co-Algoma
Steel Co-Balbach Smelting & Ref Co
Write For Catalog Now

GEORGE HAISS MFG. COMPANY INC.
142nd St & Canal Pl New York



ABELL-HOWE COMPANY
National Distributor
McCormick Building, Chicago
DRIVING CHAIN—CRANES—HOISTS—TRUCKS

Coal Economically Stored at Norfolk Navy Yard



in a 525-Ton Ferro-Concrete Suspension bunker. Distribution from this bunker is effected by three small traveling weigh hoppers.

Where labor and time are real problems, as at present, a conference with our engineers would doubtless produce very encouraging results. Our advice is free.

Send for Bulletin No. 122.

Guarantee Construction Co.
140 Cedar St.
New York



SPROCKETS and CHAINS
In stock and to order. Send for catalogue
CULLMAN WHEEL COMPANY
1353 Greenwood Terrace, CHICAGO, ILL.

USE "TRIUMPH" CHAIN

It's twice as strong as welded chain and three times stronger than cable.

It can be lengthened or shortened quickly.

Gives the longest service for the least cost because of its excellent wearing qualities.

It's most adaptable for commercial and industrial uses.

Furnished in fifteen sizes—four metals. Write for catalog now.

BRIDGEPORT CHAIN CO.

Factory and General Offices—Bridgeport, Conn.
Branches in: Chicago, 119 South Jefferson Street.
San Francisco, Wells Fargo Building.



BRASS
BRONZE
STEEL
ALUMINUM

Coal and Ashes Handling Machinery
for
Power Plants & Boiler Rooms

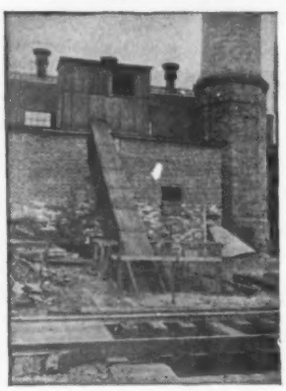


Illustration shows Bucket Elevator handling coal from track hopper direct to boiler room.

We Design and Build

Pivoted bucket carriers, elevators, conveyors, ground storage plants, wagons, loaders, etc.

Write for catalog 16A

Gifford-Wood Co.

Works, HUDSON, N. Y.
New York, Boston, Chicago, Buffalo, Philadelphia

ROBINS CONVEYING MACHINERY

Our bulletin describes the successful solution of many materials-handling problems. Let it help you.

ROBINS CONVEYING BELT COMPANY

New York, 21 Park Row
Salt Lake City, Newhouse Bldg.
San Francisco, The Griffin Co.
Chicago, Old Colony Bldg.
Birmingham, Ala., C. B. Davis Eng. Co.
Toronto, Gutta Percha & Rubber Co., Ltd.
London, E. C., Fraser & Chalmers, Ltd.



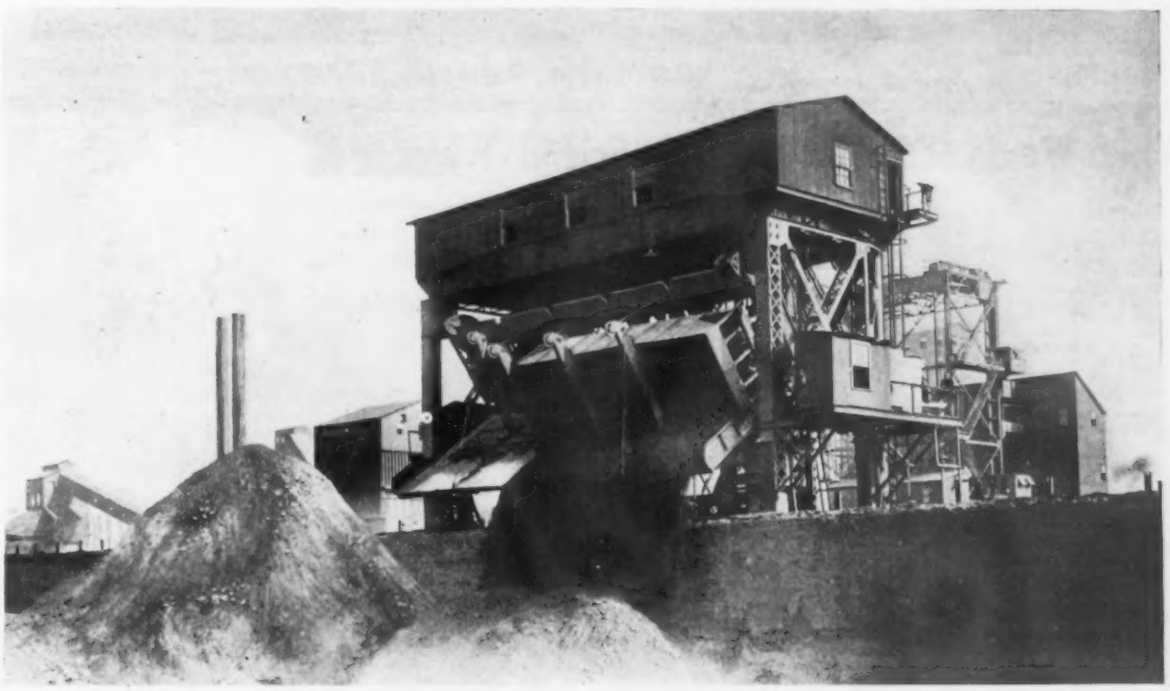
SHORT OF LABOR — USE A REVOLVATOR
Reg. U. S. Pat. Off.

The Revolvator enables you to utilize storage space to best advantage. It stacks clear up to the ceiling and wide aisles are unnecessary. It reduces to a minimum the labor and time necessary to handle and pile heavy loads.

Write for Bulletin No. IA42

REVOLVATOR COMPANY
387 Garfield Ave., Jersey City, N. J.
Sales Agent: N. Y. Revolving Portable Elevator Co.

STEEL PLANT EQUIPMENT
COKE OVEN MACHINERY
GAS PRODUCERS
ORE AND COAL HANDLING MACHINERY
SPECIAL CRANES
MINING MACHINERY
HYDRAULIC TURBINES



Ore and Coal Handling Machinery

To those contemplating the erection of plants for the loading, unloading, conveying or storage of ore or coal, we offer the exceptional experience of our engineering staff, supplemented by extensive and modern manufacturing facilities.

Specific inquiries are invited.

The moving car dumper illustrated was built for the Youngstown Sheet and Tube Co. This machine unloads into storage 300 cars per day.

Bulletin H-9, "W-S-M Car Dumpers," contains much interesting information. Write for your copy.

THE WELLMAN-SEAVER-MORGAN CO.

CLEVELAND, OHIO, U.S.A.

"Hook 'er to the Biler" Says 13 is a Lucky Number

What Would You Have Told Friend Whipple?

Here is his little letter.

Glens Falls, N. Y., May 1, 1918.

Craig Ridgway & Son Co.,
Coatesville, Pa.

Gentlemen:

Please send me literature descriptive of your Steam-Hydraulic Elevator. Have read your ad. in the "Iron Age" for the last thirteen years. Is thirteen an unlucky number?

Yours truly,
CLAYTON T. WHIPPLE.

"Is Thirteen an Unlucky Number?"

Suppose you were making the most splendid elevator the world has known, and over 2000 of the biggest concerns in the land were sounding its praises and sending in repeat order after repeat order until you were about "swamped" with orders.

What sort of an answer would you have made to Friend Clayton's question as to luck?

Why? to be sure. But that is not what we told him. Guess what we wrote? Why, just this:

"Dear Whipple, your letter has given us the dope for a rattlin' good advertisement. Just keep that thirteen-year-old ad. reading eye of yours a little while longer on the 'Iron Age,' and you'll see the good old Yankee name of Whipple in print."

We didn't have to tell the Glens Falls Hardware manufacturer after his 13 years ad reading what it means to

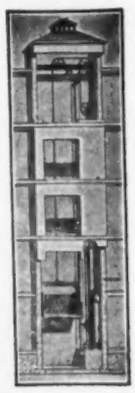
"Hook 'er to the Biler"



Double Geared



Direct Acting



Elevator in Large Soap Factory in Jersey City

CRAIG RIDGWAY & SON CO., Coatesville, Pa. **Elevator Makers to Folks Who Know**

So do we. Any manufacturer who can get his advertising read week after week for thirteen years is to be congratulated.

But "Hook 'er" is not the only one. Literally hundreds of advertisers have used The Iron Age for even longer periods and in that time have effectively cultivated thousands of potential customers. The good-will and prestige they have thus built have been in no small degree responsible for the growth of their businesses.

The Iron Age is the standard of authority throughout the metal-working trade. The information presented in its Editorial and Advertising pages is relied upon to point the way to the proper conduct of its subscribers' plants. That is the reason over 1900 advertisers regularly use space. They find it profitable.

THE IRON AGE

239 W. 39th Street, New York City

The Old Corn Cob Pipe Supplants the Cigaret

And Bluff, Baby Moustaches and a Sheepskin no longer answers for Real Engineering.

We are at War. Things are Serious. Men must be able to **DO.**

A Defeated General is never forgiven.

A trip up and a fall down in Peace means only a little witch hazel or arnica, or a "Don't cry, Willie, ma-ma'll rub it!"

But a stumble and a drop in War means Disaster incurable and a "broken line."

Consequently the Real Engineer, and not "Poppn's Boy," who just squeezed through college, is coming to the front.

And the Real Engineer—**THE FELLER-WHO-HAS-IT-TO-DO** will be found at the end of his dear old corn cob pipe.

And, Beloved, if you will lend me your ear a minute, I will put a bee in your bonnet,—

Sh—! The Real Engineer, the Corn Cob Pipe Engineer, the Fellow Who Must Make the Old Shebang Hum is the Fellow who will surely

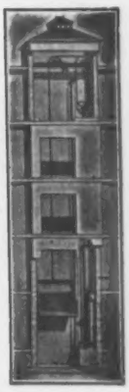
"Hook 'er to the Biler"



Double Geared



Direct Acting



Elevator in Large Soap Factory in Jersey City

CRAIG RIDGWAY & SON CO., Coatesville, Pa. **Elevator Makers to Folks Who Know**

GODFREY COAL CONVEYOR
Single rope installation.
Storage 1000 tons per 100 feet.



One man operator. Handles all sizes of coal up to 60 tons per hour. Can be erected and operated at any angle from railroad switch.

JOHN F. GODFREY, Elkhart, Ind.

BLAW-KNOX COMPANY

"BLAW" BUCKETS

"BLAW" FABRICATED STRUCTURAL STEEL
STEEL PLATE WORK TRANSMISSION TOWERS
"KNOX" WATER COOLED FURNACE EQUIPMENT
PRESSED AND WELDED STEEL PLATE CONSTRUCTION

General Offices: PITTSBURGH, PA.
District Sales Offices:
NEW YORK 165 Broadway CHICAGO Peoples Gas Bldg. SAN FRANCISCO Rialto Building



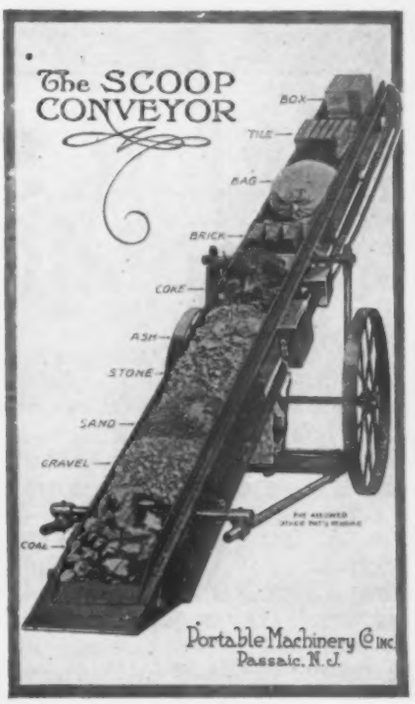
ELECTRIC MOTOR

First aid to overworked labor and over-burdened payroll. Self-contained, easily and fully controllable, speedy digging and rehandling machine for indoor or outdoor use. Hooked up in a jiffy to any lifting machine. Catalog 44.

The Hayward Co., 46-50 Church St., New York

SELL YOUR SECOND HAND MACHINERY THROUGH THE CLEARING HOUSE SECTION OF THE IRON AGE





WILL DO THE WORK OF FROM 6 TO 12 MEN

Hundreds of manufacturers are now using the Scoop Conveyor to load and unload cars, trucks and wagons and to stack into storage piles or bins.

Ask for further information.

PORTABLE MACHINERY CO., Inc.
PASSAIC, N. J.



The Jeffrey Loader, operated by one man, saves the wages of 5 to 10 men in handling sand, gravel, stone, ashes, coal, coke, etc.

Conserve Man Power By Handling Your Materials Mechanically

JEFFREY CONVEYERS

in hundreds of plants are increasing production, saving time, labor and money and releasing valuable labor for more useful work.

Let Jeffrey Engineers co-operate with you in selecting the Right Conveyer for your requirements.

The Jeffrey Mfg. Co.
925 North Fourth St., Columbus, Ohio



Jeffrey "Reliance" Drag Chain Conveyers are great time and labor savers for handling ashes in power plants, also for cement clinkers, stone, etc.



Saving 5 Hrs. On a Car-Loading Operation

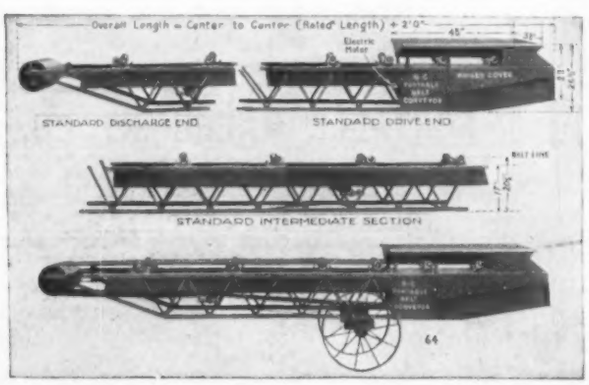
The B-G Portable Belt Conveyor shown in the above illustration has cut the cost of loading cars in half for its over-satisfied user. Before this conveyor was used it took the laborers 8 hours to load a car, whereas the same force with the conveyor can load the car in 3 hours. Are you using four or five men on a job that one man and a B-G Belt Conveyor could handle in half the time?

Both styles of B-G Conveyors are constructed from materials of the finest quality, and are right and compact.

Style "A" has a plain belt suitable for horizontal conveying or for angles up to 20 or 25 degrees.

Style "B" has a special flight belt which will handle materials at angles up to 30 or 40 degrees. They require very little room for storage when not in use, because they are portable.

The results obtained in the way of time and labor saving and increased ability to ship your products promptly, through the use of B-G Conveyors are gratifying. Send for Booklet containing complete information.



Standard Sectional Units

We have secured the advantage of quantity production at the same time meeting the specialized requirements of different users. Our unit construction enables us to furnish conveyors of various lengths and widths, carried on trucks or trolleys in such combinations as local conditions require. These various types are assembled from our basic units which are manufactured in quantities for stock. Our standard lengths run in 3-foot multiples. Standard drive and take up ends together form a 15-foot conveyor, and standard intermediates are made in 3, 6, 9, 12 and 15-foot lengths.

Barber-Greene Company

Office and Works:

550 W. Park Avenue — **Aurora, Illinois**

Buffalo, 728 Brisbane Building
Chicago, 608 South Dearborn Street
Cleveland, 340 Leader-News Building
Detroit, 35 Woodbridge Street, West
Hartford, Conn., 249 Pearl Street
Kankakee, Ill., 788 Evergreen Street
Kansas City, 2918 Southwest Boulevard
Milwaukee, 122 West Water Street
Minneapolis, 519 Andrus Building
New York City, 1425 Tribune Building
Philadelphia, 2103 Market Street
Pittsburgh, Fulton Building
Salt Lake City, 315 Dooly Block
St. Louis, Franklin and Channing Avenues
Canadian Sales Agents, Mussens Ltd., Montreal
Export Representatives, Allied Construction Machinery Corporation, New York City

Standard Buckets in Stock

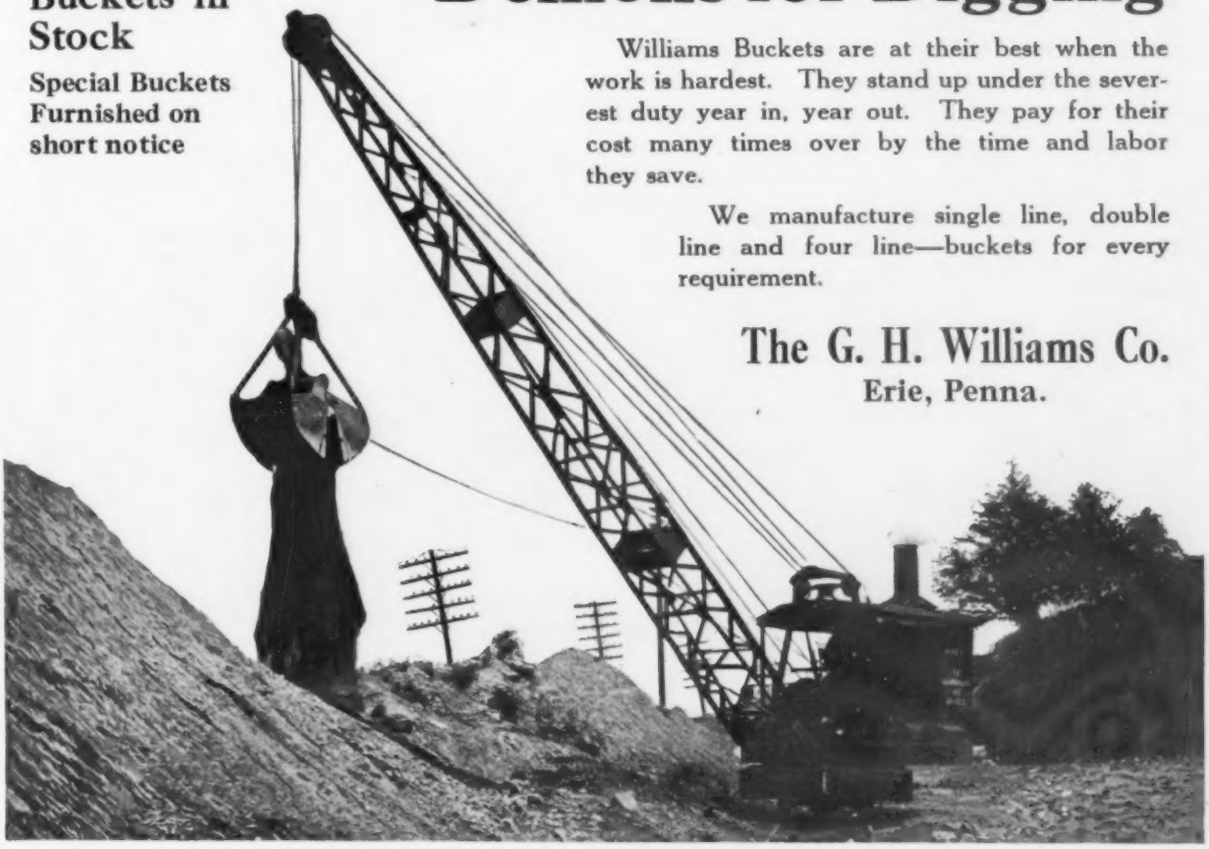
Special Buckets Furnished on short notice

Demons for Digging

Williams Buckets are at their best when the work is hardest. They stand up under the severest duty year in, year out. They pay for their cost many times over by the time and labor they save.

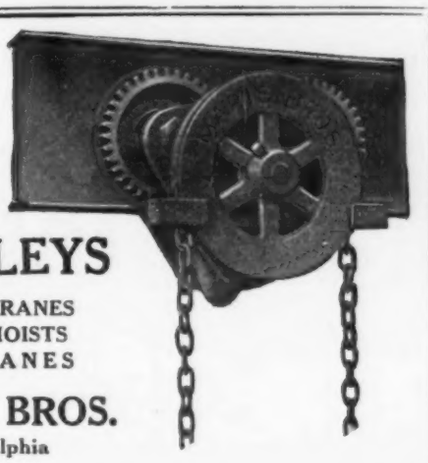
We manufacture single line, double line and four line—buckets for every requirement.

The G. H. Williams Co.
Erie, Penna.



Better Than Others

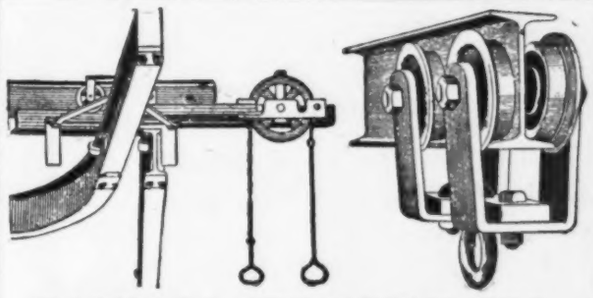
Cost Less



TROLLEYS

ELECTRIC CRANES
ELECTRIC HOISTS
HAND CRANES

MARIS BROS.
Philadelphia



RANDALL TRAMRAIL CO.

Overhead Tracking and Equipment for Foundries and Factories, Roller Bearing Trolleys, Switches, Hoists, Dump Buckets, etc.

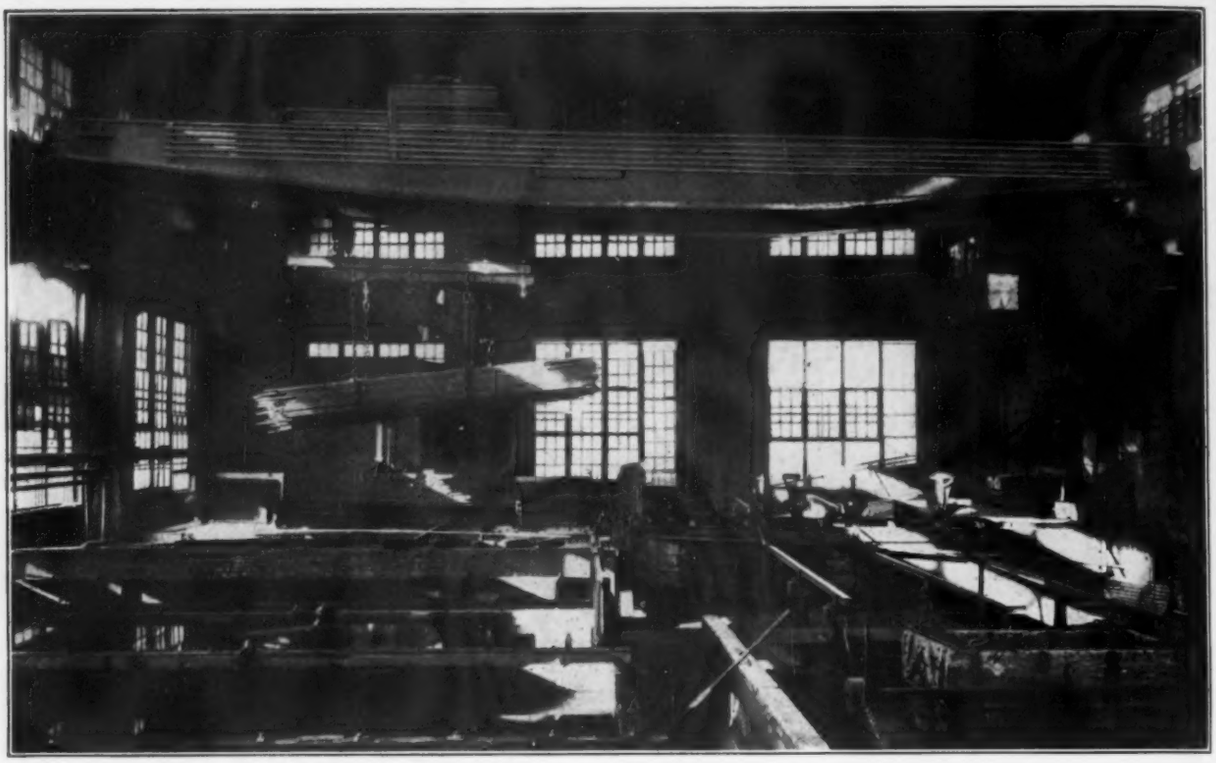
331 North 2d Street Philadelphia

Owen Buckets

cover a range of work that ordinarily requires the use of two or more buckets of different design because its adjustable features of operation quickly adapts it for efficient use in any crane or derrick and in all kinds of material. Eliminate idle equipment. Let an Owen work for you every minute.

The Owen Bucket Co.
408 Rockefeller Bldg.
CLEVELAND OHIO





"Cleveland" Cranes for Dipping Pipes

This "Cleveland" is giving exceptional service in the pickling department of a large pipe plant. It is one of the 15 ton 4 motor double drum types that are proving to be great time and labor savers for various uses in many big plants.

The pipe is suspended by chains which are attached to the cables that wind around the two drums. This method of dipping pipe is the quickest and most economical. All gears, motors, electrical parts, etc., are enclosed to protect them from dust, grit and acid fumes. This is only one use of "Clevelands."

Our catalogs contain illustrations showing the various other uses of "Cleveland" cranes. Write for your copy now.

THE CLEVELAND CRANE AND ENGINEERING CO.

WICKLIFFE, OHIO

50 CHURCH STREET
NEW YORK

FIRST NAT'L BANK BLDG.
PITTSBURGH, PA.

ERIE
SIMPLE-ACCESSIBLE-DURABLE
CRANES

Prompt deliveries on traveling cranes.

Fabricators and Erectors of Steel Buildings. Structural Steel from Stock

The Erie Steel Construction Co., Erie, Pa.



Alliance Double Cantilever Gantry Crane, Magnet Type

Specially adapted to service in the stock yards of steel plants and wherever it is desirable to have a storage space in the middle and railroad tracks under the cantilevers.

Built in any span and capacity and for any service; either magnet or grab bucket type. Let us know exactly what your crane requirements, either present or prospective, are, and we shall be pleased to make estimates.

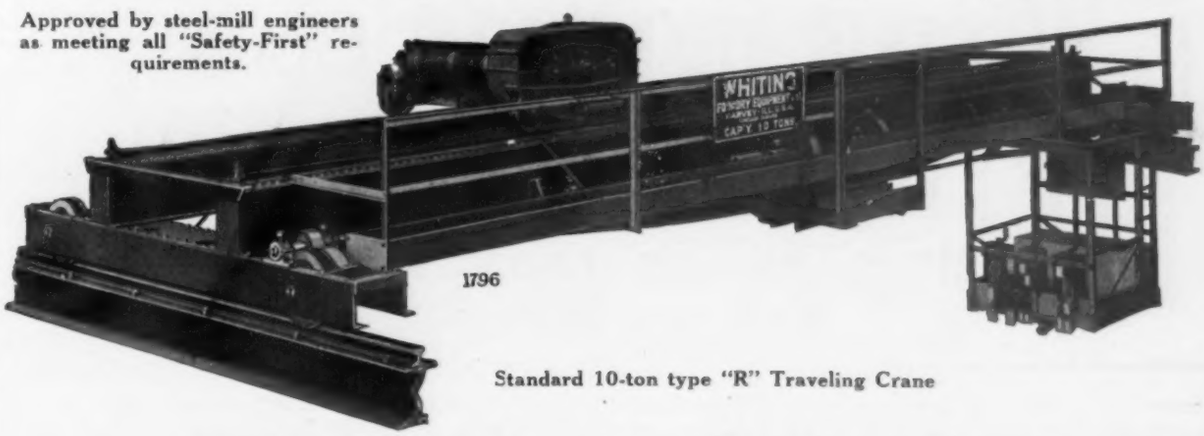
PITTSBURG *The Largest ... of the World's Largest Cranes* NEW YORK

THE ALLIANCE MACHINE CO.
ALLIANCE, OHIO.
ENGINEERS AND BUILDERS

BIRMINGHAM CHICAGO

THE WHITING TYPE "R" CRANE

Approved by steel-mill engineers as meeting all "Safety-First" requirements.



Standard 10-ton type "R" Traveling Crane

Consider These Points When You Buy a Crane:

Trolley gears operate in oil in dust-proof cases.
No trolley gears overhung.
Dependable brakes.
Positive limit switch.
Standard motors and controllers.
All gears and working parts readily accessible.
Substantial, rigid construction throughout.

Our Type "R" Embodies These Essentials

SEND FOR CATALOG 130

Complete Foundry Equipments

WHITING
FOUNDRY EQUIPMENT CO.
HARVEY-ILL. U.S.A.
CHICAGO SUBURB

Cranes of all Types

CHAMPION CRANES

THE CHAMPION ENGINEERING CO.

ENGINEERS : MANUFACTURERS

KENTON, OHIO

R. W. VALLS, Vice-President and Chief Engineer

NEW YORK:
J. N. KINNEY, Contracting Engineer
30 Church Street

PITTSBURGH:
THE LAUGHLIN-BARNEY MACHINERY CO.
Union Arcade



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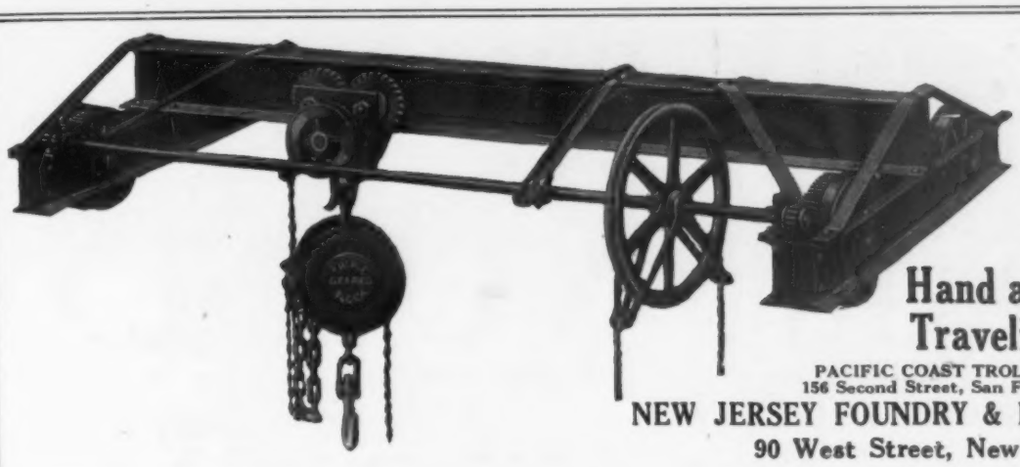
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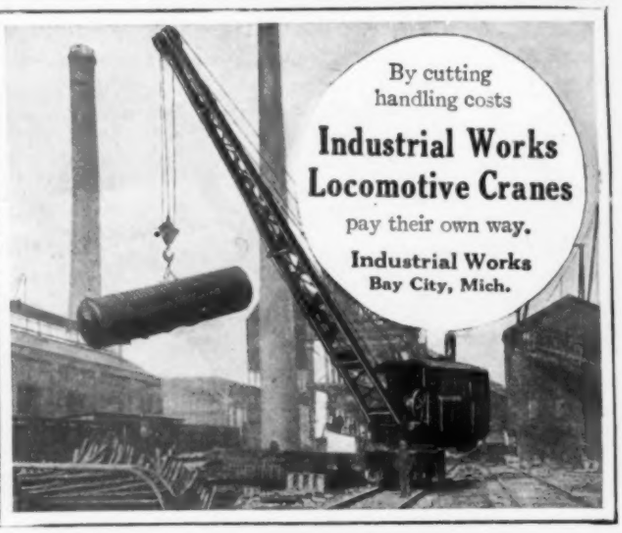
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are built to stand hard and continuous service. Write us for details and let us help you make profits by the economical handling of your material.

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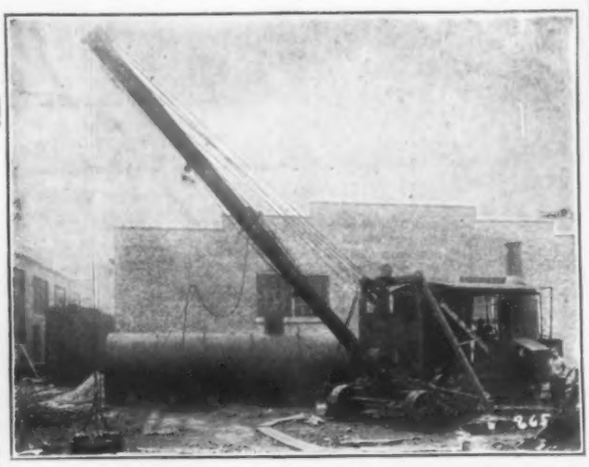


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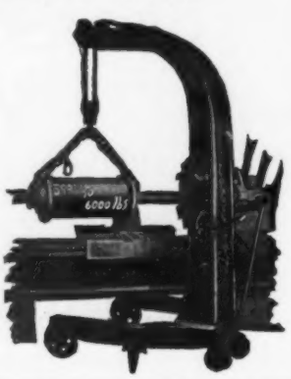
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Gets anywhere, lifts three tons, and with it one man takes the place of twenty.

The Canton "Handiest Tool" is built to save you money.

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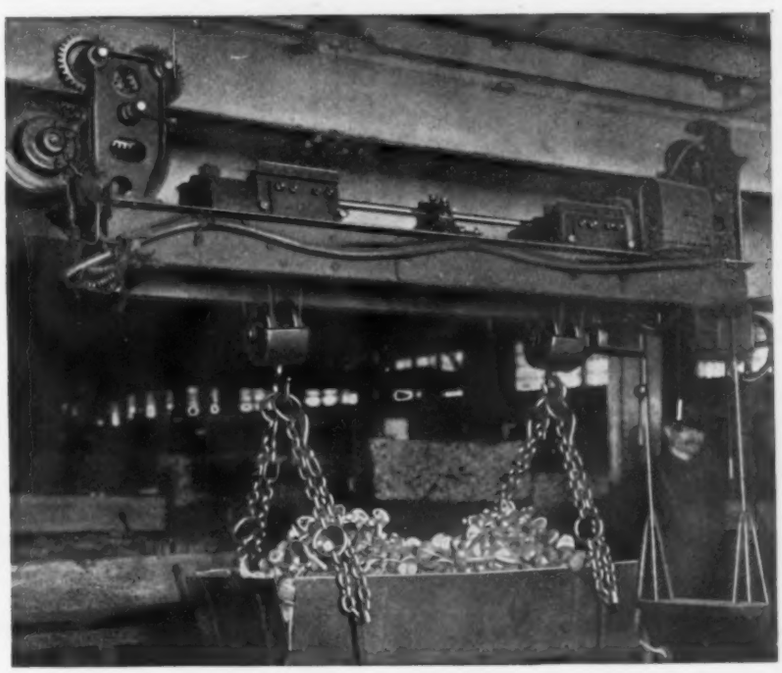
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will save you thousands of dollars yearly. Shepard Engineers are at your disposal any time, to design an equipment that will do your handling most efficiently. Their service is gratis. Consult them.

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A Better Way to Carry Drop Forgings to the Shipping Room



The installation of time and labor-saving methods is becoming more necessary every day in every line of business. Euclid Electric Monorail Hoists have played a big part in effecting such savings in Machine and Structural Shops, Foundries, Warehouses, Railway Shops and all sorts of industrial plants.

The illustration shows a Euclid Electric Monorail Hoist in drop forge plant. The track is arranged to serve a battery of forges, conveying the finished drop forgings to the shipping room. The saving in time and labor effected by this method more than pays for the installation.

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TYPE DQ—ELECTRIC
NORTHERN HOIST



Handling forgings with a DQ Hoist Direct Current with Type 304 Trolley

In D and DQ Hoist We offer an all steel geared hoist enclosed dust proof suited to a wide range of duties.

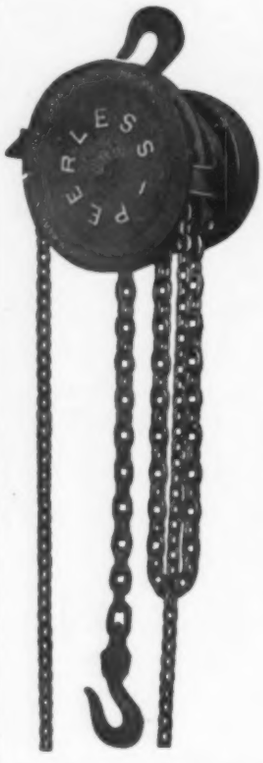
We also make many other types.

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"with all work-lifting parts of steel" and a noiseless automatic sustaining mechanism which will hold the load at any point securely until released by the operator.

The improved hand chain guide will not allow the chain to jump, jerk or catch at any speed or angle of pull.

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is the logical and safe answer to all Hoisting problems. It is the most efficient and will outlift and outlast any other block made. Sizes ¼ to 30 tons.

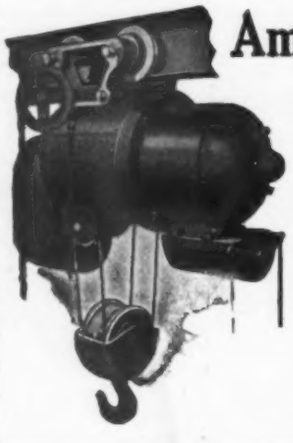
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Here's a Hoist that Stands "the Gaff"

Built in combination with all types of cranes ¼ to 10 tons with D.C. or A.C. current optional.

Sturdy rugged design, enclosing all moving parts.

Roller bearings, disc-type mechanical load brake and positive automatic limit stop are some of the features.

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ELECTRIC HOISTS
One to Five Tons Capacity

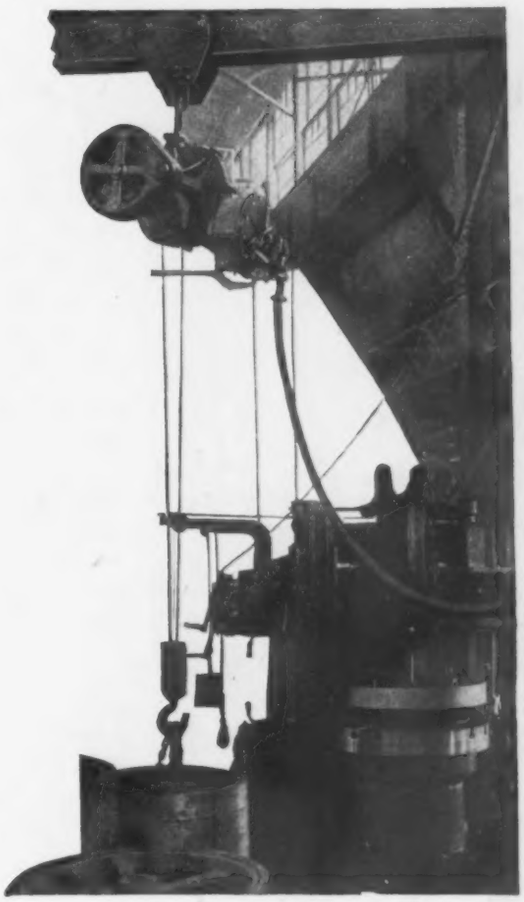
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With or without I-beam trolleys.

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THE COST OF HOISTING

Is not to be figured as the cost of operating your hoist but in terms of the money you save by cutting down your machinists' unproductive time—the time that it takes two, three or more high-priced men to place a heavy piece of work.



"IMPERIAL" AIR HOISTS

Will handle loads from ½ to 5 tons weight quickly, conveniently and safely. The hoist is self-stopping at the end of its 20 ft. maximum lift. Anyone can operate it.

Automatic lubrication makes constant attention unnecessary.

Vibrationless lift or lowering stop make the "Imperial" an ideal hoist for handling delicate work.

You will want a copy of the complete **Pneumatic Tool Catalog** describing Imperial Hoists and the Little David Tools.

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"LITTLE DAVID" PNEUMATIC TOOLS FOR EVERY DUTY



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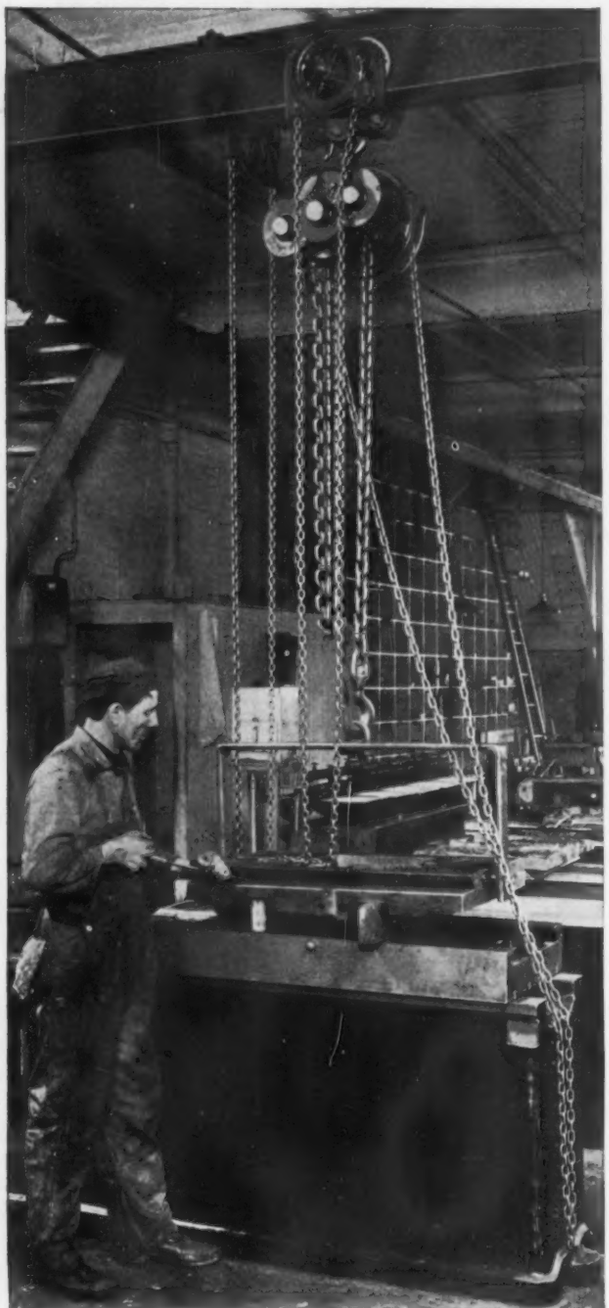


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29-H



CYCLONE HOISTS
HIGH-SPEED

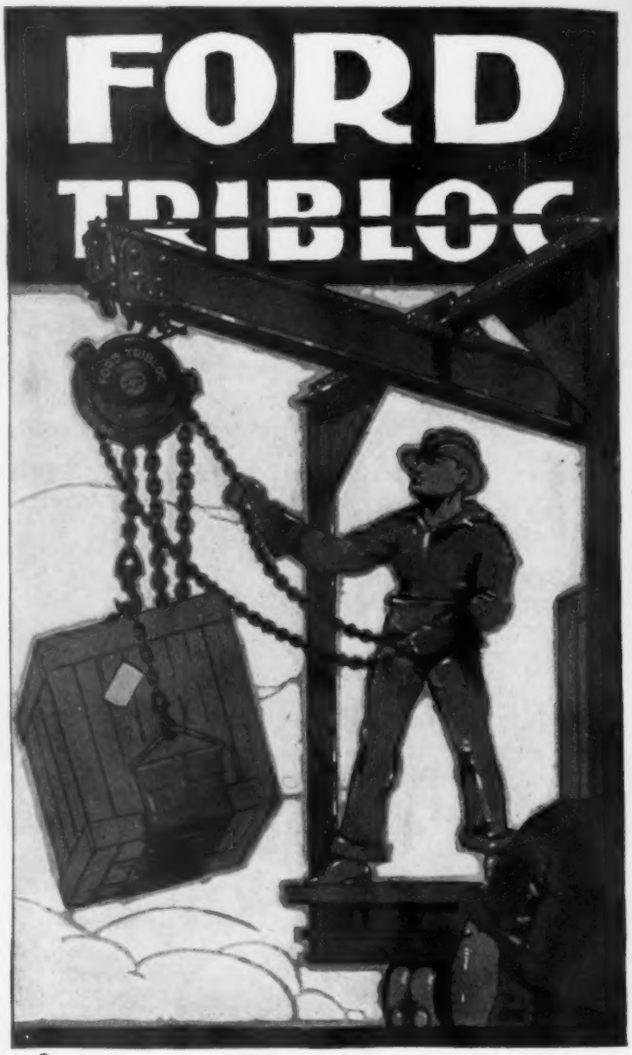
C-M "Matchless" Trolleys and C-M Traveling Cranes all help to reduce costs and speed up production in this up-to-date factory. The illustration shows only one of the many uses they find for C-M products.

Wherever heavy materials have to be lifted and conveyed C-M Hoists, Cranes and Trolleys will effect a big saving in costs. This has been proven in thousands of cases.

To find out how much they will save you, write today for Catalog No. 49

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Equally Adaptable to Outdoor Use

THERE are any number of applications outside of the shop for a Ford Tribloc Chain Hoist. For example, by erecting a simple overhead trolley on a motor truck, loading and unloading of heavy or cumbersome loads may be speedily and economically accomplished.

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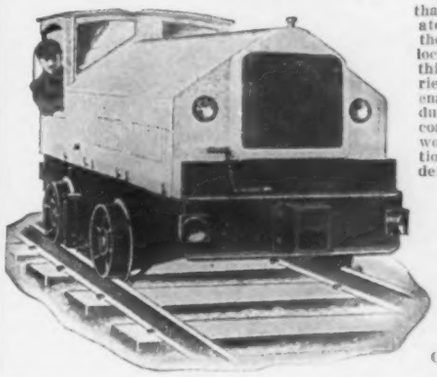
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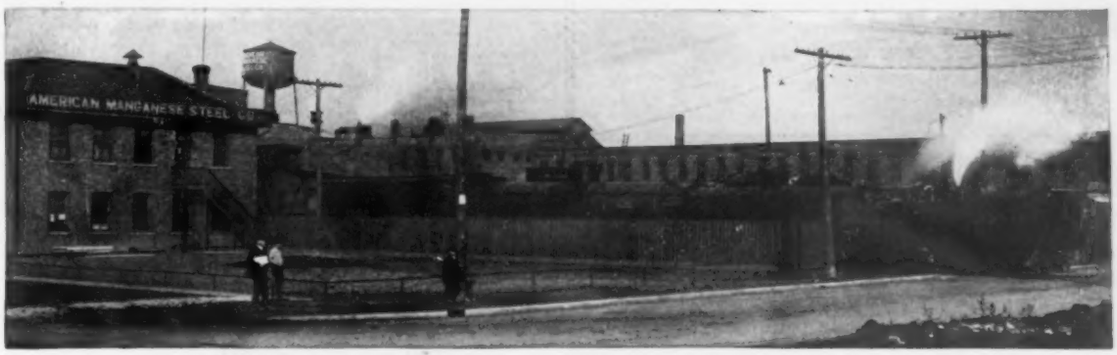
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TIME SAVED—by moving cars about your plant when YOU want them moved instead of waiting for the R.R. to switch them when THEY are ready will soon pay for this locomotive.....Costs nothing when not in use.....Ready on a moment's notice.....Does not require a licensed engineer. Where service is continuous, kerosene may be used for fuel.

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Sprague Electric Hoists and Monorail Cranes

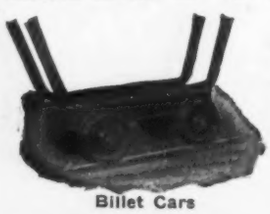
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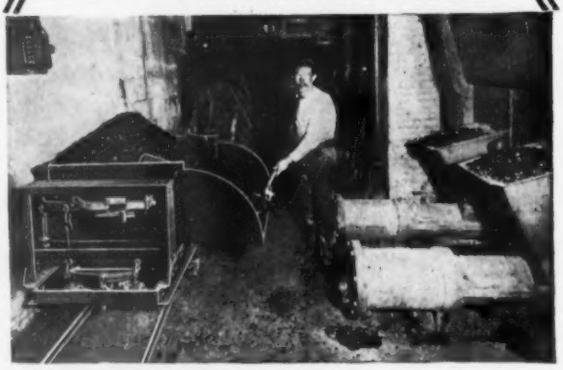
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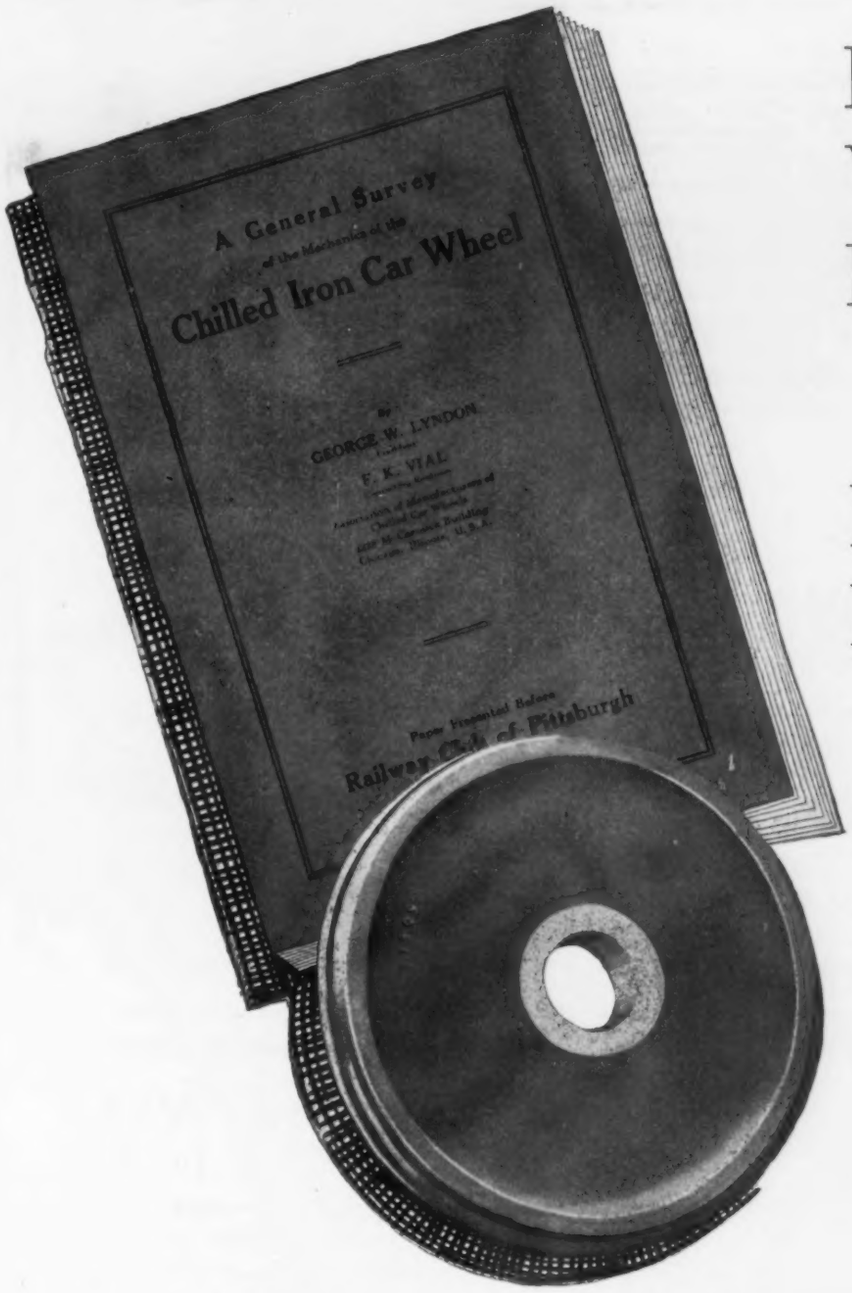
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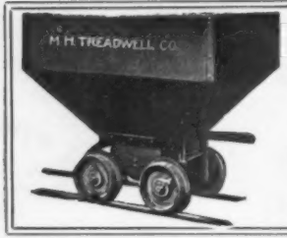
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Send for booklet showing how 1 man can do the work of 4 or 5—how to meet the labor shortage—by using the
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They will cut your costs
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In the shortest possible time

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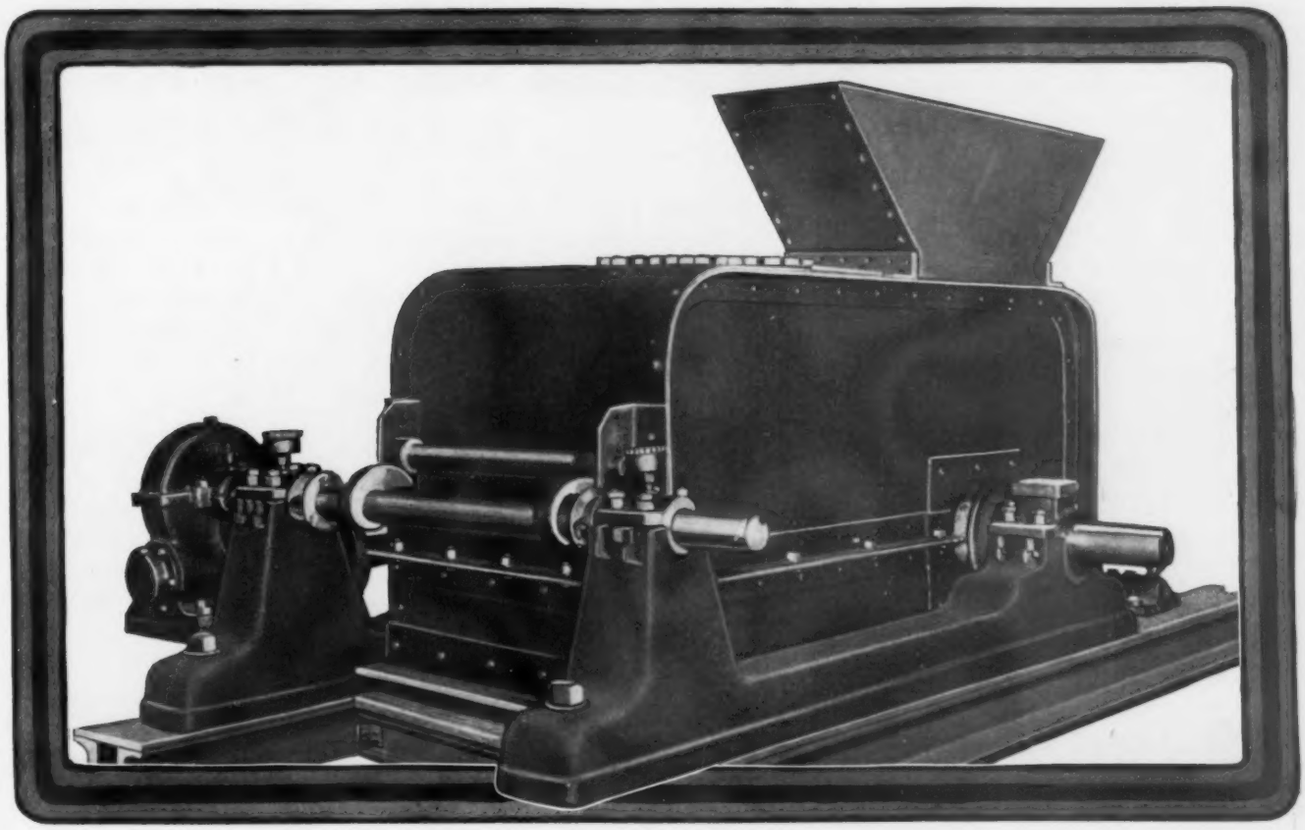
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for production and jobbing castings

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Produces Ideal Molding Sand

The Link-Belt Molding Sand Revivifier shown above represents the latest development in equipment for properly tempering and mixing molding sand.

IT BREAKS up all old combinations, lumps, pellets, etc., separating the sand particles completely, and when the proper amount of water and new sand is added, produces a molding composition unequalled by any other method.

This machine is of simple, rugged construction, and will withstand the most severe service. The used sand, after water and a small percentage of new sand has been added, is delivered into hopper and passes onto the revolving arms, which are set at such an angle as to drive sand forward across the centerline against a curtain of rods. The impact breaks up lumps and pellets, and the action of the revolving arms insures a thorough mixing of all particles, thereby producing an ideally tempered sand.

If the sand is hot when delivered to Revivifier the temperature will be greatly reduced.

Detailed description, prices, etc., gladly mailed upon request.

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LINK-BELT

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Pridmore



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Combination Jar Ramming and Air Power Rock-Over Drop Machine

An absolutely perfect draw is accomplished by a guide shaft below and two above. The arms that travel on these guides are connected by a rigid frame. This construction relieves the draw cylinder with only the function of carrying the load.

The machines are also fitted with very strong flask clamps and an air locking device. This device automatically locks the pattern plate to the roll-over frame at four points after the mold is rammed, and the rolling over takes place.

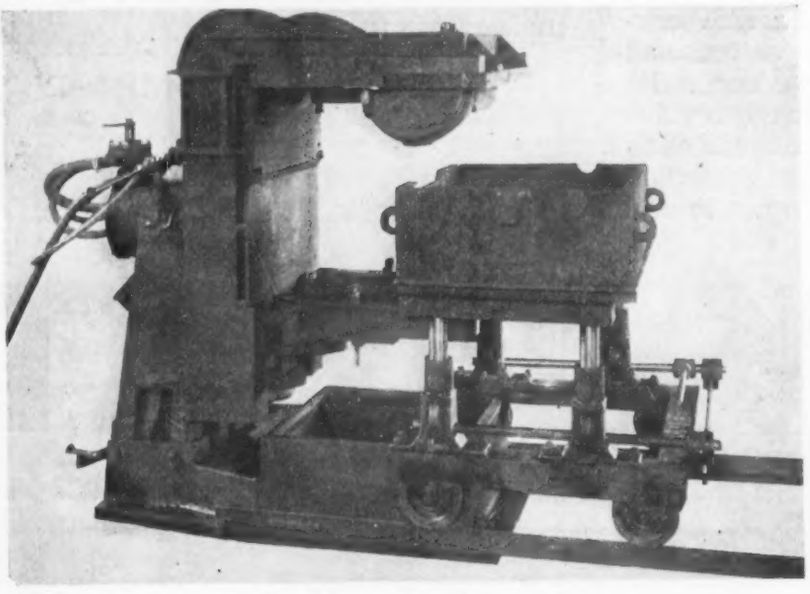
HENRY E. PRIDMORE 19th & ROCKWELL STREETS CHICAGO, ILL.

Foreign Representative: J. W. JACKMAN & COMPANY, LIMITED, Show Rooms and Works, VULCAN WORKS, Blackfriars Road, Manchester, England. Head Office, CLAXTON HOUSE, Westminster, London, S. W.

Grimes Jolt Rammed Roll-over Machine Does the Work of Three Machines

The "Grimes" is just as efficient as a Jolt Roll-over Machine, a Jolt Pattern Draw Machine or a Plain Jolt Machine.

One operator has full and convenient control over every operation. The Roll-over is accomplished with little or no effort as the **center of gravity of the mold is the center of rotation.**



Machine No. H612—1000 lbs. lifting capacity

The "Grimes" Roll-over Machine is low in first cost, costs little to maintain and will speed up your production tremendously.

Write today for our interesting catalog.

The Grimes Molding Mach. Co.
Formerly Midland Machine Co.
1218 Hastings Street
Detroit Mich.

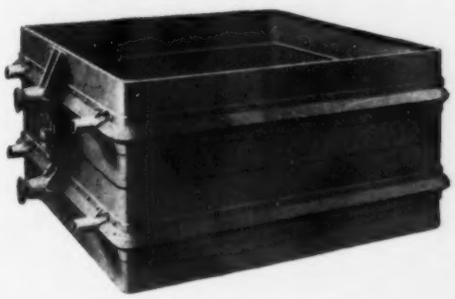


TIM'S BEEN TO WAUKESHA

"Just been investigating the workin's of Sterling Steel Flasks in the Spring City Foundry Co., and when I say you can't find anything but Sterlings in the place, and they wouldn't have any flasks but Sterlings nohow, and when I add that the Spring City Foundry Co. is one of the best equipped, most progressive motor casting plants on record, I'm giving it to you straight."

Tim Trundle

STYLE "LLT"



A Re-inforced Flask for Heavy Duty Work on Floors or Molding Machine.

A flask for our work must be extremely accurate. It must lay level on our machines and must be interchangeable. The Sterling flask successfully meets these requirements, and is also a light flask to handle.

Yours truly

Spring City Fdry. Co
C Reichl Mgr

STERLING WHEELBARROW COMPANY

MILWAUKEE **WISCONSIN**

MANUFACTURERS OF

Special Rolled Steel Flasks—Snap Flasks—Flask Pins
Shop Boxes—Special Foundry Barrows—Foundry Carts and Trucks—Skim Gates—Foundry Wedges—General Wheelbarrows and Trucks.

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DETROIT CLEVELAND

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WE BUILD METALLURGICAL FURNACES, OIL BURNERS, SANDBLASTS, OXY ACETYLENE WELDING & CUTTING OUTFITS.

SANDBLASTS

HELMETS, BARRELS, DUSTLESS TABLES, HOSE MACHINES, DUST ARRESTERS.

THE MACLEOD CO. CINCINNATI, O.

SIMPSON SAND MIXERS

Men are scarce. Materials are expensive. The Simpson Intensive Foundry Mixer permits of a maximum capacity with a minimum cost of operation and maintenance. It improves quality of the castings by a more efficient mixing of facing or core sand. Pays for itself in labor, time and materials saved. Details?

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PANGBORN CORPORATION

HAGERSTOWN, MD.

SAND-BLAST SPECIALISTS

P. O. BOX 856

HOEVEL SANDBLAST MACHINES

Patented Patented

The Result of 25 Years' Experience

Catalog B

Efficient

Safety Economic

Service Dustless

Every Kind of SANDBLAST Equipment

Revolving Barrel Machines, Rotary Table Machines, Hose Sandblast, Dustless Sandblast Rooms, etc.

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AMERICAN-WADSWORTH PRESSURE SAND BLAST APPARATUS

is a patented Automatic Filling Valve that eliminates elevating buckets, chains, overhead hoppers. No sand valves to wear. 30% to 50% higher efficiency than any suction system. Less than half the mechanism of any other pressure system.

THE SAND MIXING MACHINE CO.

52 VANDER BILT AVE. NEW YORK

Cleveland Sand Rammers

For General Foundry Uses

Are made in two standard sizes

Nos. 4F and 1H



Cleveland Rammers have high speed and practically no vibration, making them ideal Foundry Tools.

The Piston Rods are furnished either Flat or Round, as required, and are packed with a special Hemp packing that excludes all dirt.

The 4F Rammer (not illustrated) has an extension and snap-handle and is used for floor and flask work.

Catalog No. 14 shows all styles of Rammers.

The Cleveland Pneumatic Tool Co.

CLEVELAND, OHIO

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Sandblasting Shells

IS ONLY

One of Many Things

YOU CAN DO WITH THE

"PHOENIX" OPEN HOSE SANDBLAST

Over 50 foundries have installed them—many on repeat orders. It is particularly adapted for large castings, large cores, etc. The "PHOENIX" Barrel for small castings.

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PHILADELPHIA, PA.

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SAND
FACING SUPPLIES
EQUIPMENT
Sand Blast and
Magnetic Separators

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SAND BLAST EQUIPMENT

SAND BLAST MACHINES

TILGHMAN-BROOKSBANK SAND BLAST COMPANY

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BROWN SPECIALTY MACHINERY CO.

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They Screen, Temper and Mix Core and Facing Sand With One Handling

Standard Sand Mixers take the place of men and shovels, thus saving 80% on labor cost.

The Standard Sand & Machine Co.

CLEVELAND, OHIO

Straight-From-The-Shoulder Facts About

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THE LOGICAL OIL FOR CORES

150,000 gallons are used each month

Two-thirds of all the automobile cylinders produced in the Middle West are made with LINOIL Cores.

More gray iron and malleable foundries today use LINOIL than any other core oil.

LINOIL Cores are strong, dependable and do not blow.

LINOIL is a non-gas producing oil—it does not stick to the boxes, and dries quickly with little smoke.

We ship in our own tank cars

A trial will prove to you the worth of LINOIL for all kinds of core work.

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CLEVELAND, OHIO

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But McCullough-Dalzell Crucibles—always uniform—
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Write for catalog and prices.

The Cleveland Galvanizing Works Co.
Cleveland, Ohio

BARNUM RICHARDSON COMPANY

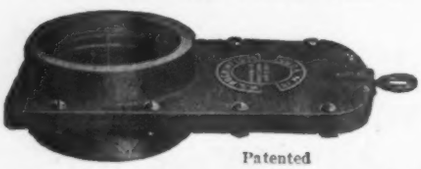
Foundry and Cupola Advisors

SPECIALISTS IN IRON MIXTURES

LIME ROCK, CONNECTICUT

NEW AIR-TIGHT BLAST GATE

FOR LOW AND MODERATE PRESSURES



Patented

Save that air (money) you are now losing thru leaky blast gates. Our NEW AIR-TIGHT BLAST GATE stops this loss.
Circular 123-H explains its many other advantages, outlining clearly its all-around superiority over the ordinary light, flimsy, cheap, leaky and unreliable blast gates, and the heavy, cumbersome, expensive and slow-acting gate valves and stop cocks.
Ask for circular and list of users.

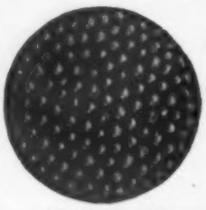
W. S. ROCKWELL COMPANY

Furnace Engineers and Contractors

50 Church St. (*Hudson Terminal Bldg.*) New York

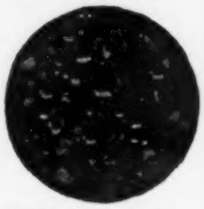
We produce the most perfect metallic abrasives that are manufactured for Sand Blast purposes

CHILLED SHOT—any size
DIAMOND GRIT—any size



LOW PRICES!

PROMPT SHIPMENTS!



HARRISON SUPPLY COMPANY

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Better Foundry Equipment

When considering core ovens, dust collectors, tumbling barrels, and sand blast equipment, come to us.

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Angular Grit

The Scientific Metallic Blasting Abrasive

Reduces Sand Blast Costs 20 to 80 Per Cent

TRADE MARK
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Pittsburgh Crushed Steel Co.
Sole Mfrs. Established 1888
Pittsburgh, Penna., U. S. A.



SAND DRYING STOVE

Warranted to give satisfaction, also to be the simplest and most economical device on the market.
Ask us

INDIANA FOUNDRY CO.
Indiana (C. H.), Penna.

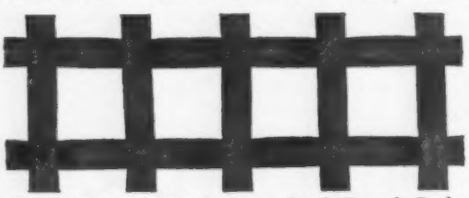
Use Shot Blasting Instead of Sand Blasting

GLOBE

Sand leaves a sand coating. Globe Shot leaves a perfectly smooth surface. Sand breaks into a fine dust that hampers the efficiency of both your work and your workmen. Globe Shot wears like iron. It is.

The Globe Steel Co., Mansfield, Ohio

DOUBLE CRIMPED SCREEN



For Grading Crushed Rock, Stone, Sand, Gravel, Coal, etc.

Tyler screens are used extensively on trommels for the reason that they work much faster than steel plates, and, made from special wire, they will withstand long wear.

THE W. S. TYLER COMPANY
CLEVELAND, OHIO

At Boston Convention many Brass Foundrymen came to our booth and asked about
RILLTON BRASS CLEANER

They had heard good reports from other Foundrymen

OUR BEST ADVERTISEMENT IS THE SATISFIED CUSTOMER

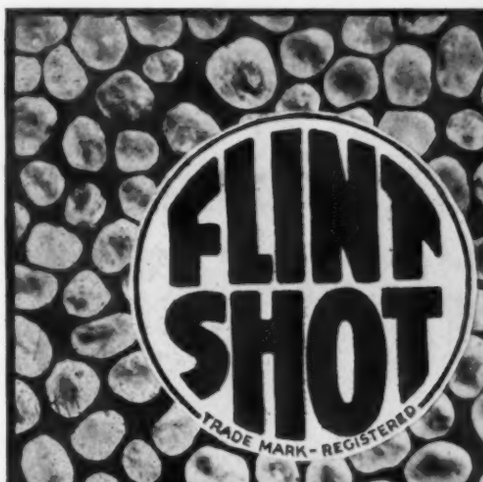
A barrel sent on approval prepaid freight. Ask us for list of users.

THE S. OBERMAYER COMPANY
No. 2835 Smallman Street Pittsburgh, Pa.
Chicago Cincinnati St. Louis Philadelphia

McLAIN-CARTER OPEN HEARTH FURNACE

Will produce fluid metal at high temperatures that will make castings *superior to crucible steel* at a lower cost.

McLAIN-CARTER FURNACE COMPANY
906 Goldsmith Bldg. Milwaukee, Wisconsin



UNDER THE MICROSCOPE

The background of this ad is made up by pasting together micrographs of Flint Shot, greatly magnified.

From it you will note the symmetry and uniformity of the pure Flint nodules which we have given the appropriate name "Flint Shot."

This uniformity is secured by *manufacturing* processes, beginning with the hydraulic disintegration of St. Peters Rock, and ending with the scrubbing, drying and screening of the resulting flint "shot."

FLINT SHOT

HAS ESTABLISHED A DISTINCTIVE PLACE FOR ITSELF IN THE SAND BLASTERS ART

So much so, that it is now in demand from coast to coast, buyers apparently being willing t› pay heavy freight charges rather than being satisfied with local sands.

Send for an envelope-sample and ask for our Book —Little Journeys of the Flint Shot Man.

UNITED STATES SILICA CO.
SOLE PRODUCERS OF FLINT SHOT
427 PEOPLES GAS BLDG., CHICAGO

DETROIT
ROCKING ELECTRIC BRASS
FURNACE

REDUCES METALLIC LOSSES

The constant agitation produces a uniform temperature throughout the entire charge, prevents local superheating and consequent loss by volatilization. Produces thoroughly homogeneous alloy.

HIGH THERMAL EFFICIENCY

Loss of heat radiation cannot occur to any appreciable degree because of scientifically designed insulation which prevents the conduction of heat to the shell. Refractories are never appreciably hotter than the melt.

SMALLEST REFRACTORY EXPENSE

Because of the constant washing of the walls by the melt, the walls do not become overheated and are therefore less subject to oxidation.

WRITE FOR COMPLETE INFORMATION

DETROIT ELECTRIC FURNACE CO.

642 BOOK BUILDING, DETROIT, MICH.

NOTHING WILL EQUAL THE ECONOMY
AND EFFICIENCY OF

Hagan Stoker Fired Furnaces

GEORGE J. HAGAN COMPANY

Furnace and Combustion Engineers

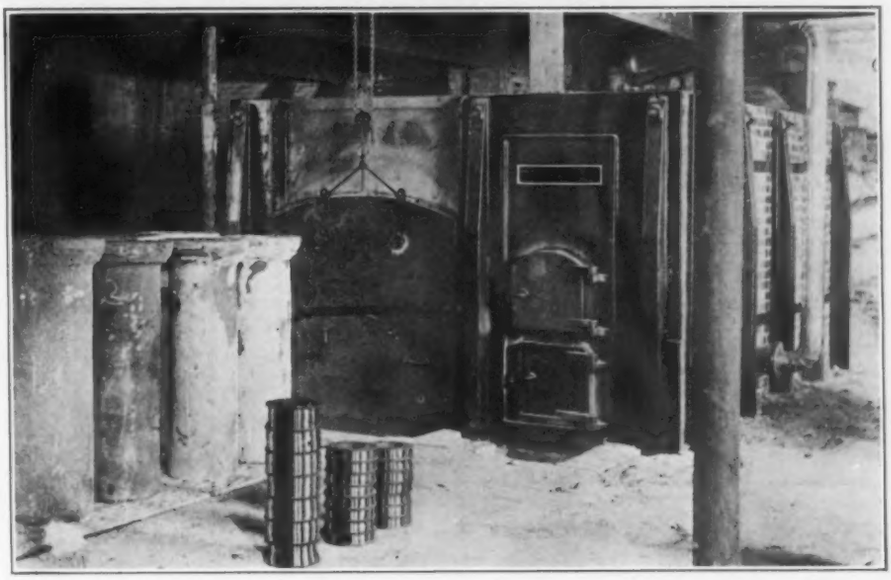
Peoples Bank Building **PITTSBURGH, PA.**

Records as Low as **216 lbs. of Coal**
to the **Ton of Finished Sheets**

We have stoker fired over Five Thousand Furnaces in 3½ years

THE OLD WAY

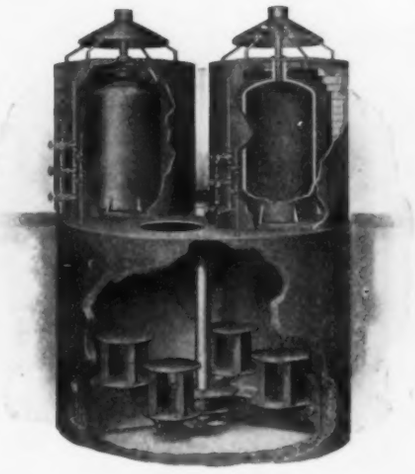
Are You Still Using This Anti-quated Method of An-nealing Your Metals



Which Requires One Day's Time for An-nealing One Charge of Metal?

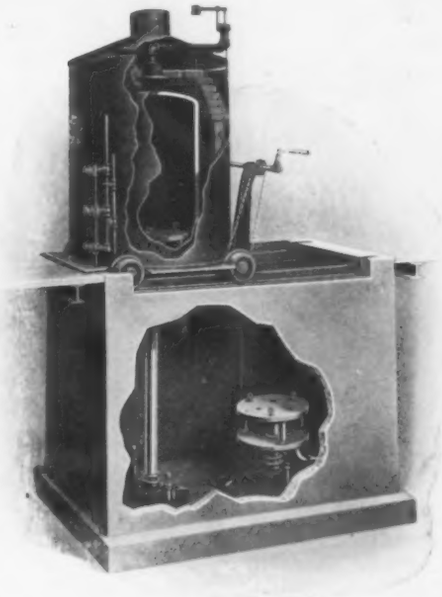
WHY NOT TRY

THE NEW WAY



VERTICAL TYPE
DOUBLE CHAMBER

Ask For Bulle-tin 83-N



VERTICAL TYPE
SINGLE CHAMBER

"Bright" Anneals 5000 lbs. per hour. Vertical Type—built in all sizes with single or double chamber. Eliminates useless handling, pickling or washing of metals. No protection coating required. Many other types of NON-OXI-DIZING Furnaces.

Charles F. Kenworthy, *Waterbury, Connecticut*

THE PITTSBURGH ELECTRIC FURNACE

THE MOST RAPID, POWERFUL AND EFFICIENT STEEL-MAKING FURNACE ON THE MARKET.

THESE FURNACES EFFECT LARGE ECONOMIES OVER OTHER STEEL MAKING METHODS IN STEEL FOUNDRIES.

PITTSBURGH FURNACE COMPANY

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PITTSBURGH, PA.
Phone Court 4112-X

215 Sycamore St.
MILWAUKEE, WIS.
Phone Grand 123



Tempering and Blueing

This furnace is designed to give accurate heats and allow perfect control by the operator.

Salt, oil, tallow, sand or some similar bath may be used for tempering and blueing taps, dies, springs, fire arm parts, screws and other small parts. Hood furnished or not as preferred.

Ask for catalog No. 23.

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Chicago Representatives: Neldow & Payson, Madison Terminal Bldg., 9 So. Clinton St.
Detroit Office: Garfield Bldg., 870 Woodward Ave.
Pittsburgh Office: Room 501 Manufacturers' Bldg.

Heat-Treating Problems

Let Us Handle Yours

W. S. ROCKWELL CO. INDUSTRIAL FURNACES ESTABLISHED 1888 NEW YORK

We make inspection of plant, devise methods and means of working, prepare plans, furnish complete industrial furnace equipment and guarantee results, using coal, coke, gas or oil. Write for Catalog No. 30R.

W. S. ROCKWELL COMPANY

Furnace Engineers and Contractors
50 CHURCH STREET NEW YORK
(Hudson Terminal Bldg.)

Do You Heat-Treat Carbon Steels?



Then use a Johnson Furnace that requires no forced air blast.

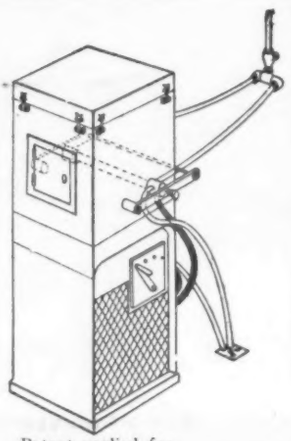
It will also heat-treat ordinary carbon steels without a muffle.

The Johnson No. 108 Furnace shown here is successfully used as an all-around shop and tool-room furnace. Write for Catalog.

Johnson Gas Appliance Co., Cedar Rapids, Iowa

Electric Furnaces

Capacity, 1 to 20 bbls.
Temperature control, 500° to 5000° F.
Current consumed, ¾ kw.-hrs. per minute.
Time of melting any high temperature metal, 2 to 3 minutes.
Furnace built to any desired sizes.



Patent applied for

The Bario Metal Corporation
167 West 18th Street
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Vom Baur Electric Furnaces

Sizes 1, 2, 3, 5, 10 and 15 ton capacity.

34 electric furnaces of various types installed under our supervision.

Complete installations recently made in three months.

T. W. PRICE ENGINEERING CO. Inc.

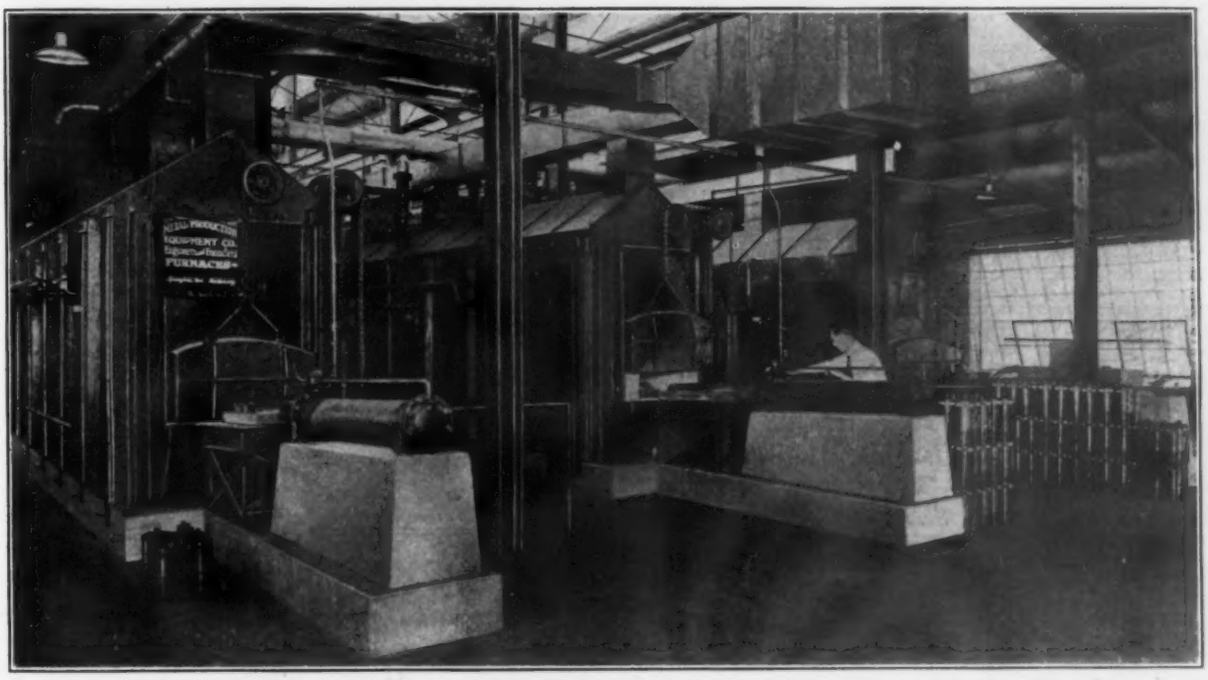
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Steel Plants & Foundries.

Woolworth Bldg. New York City

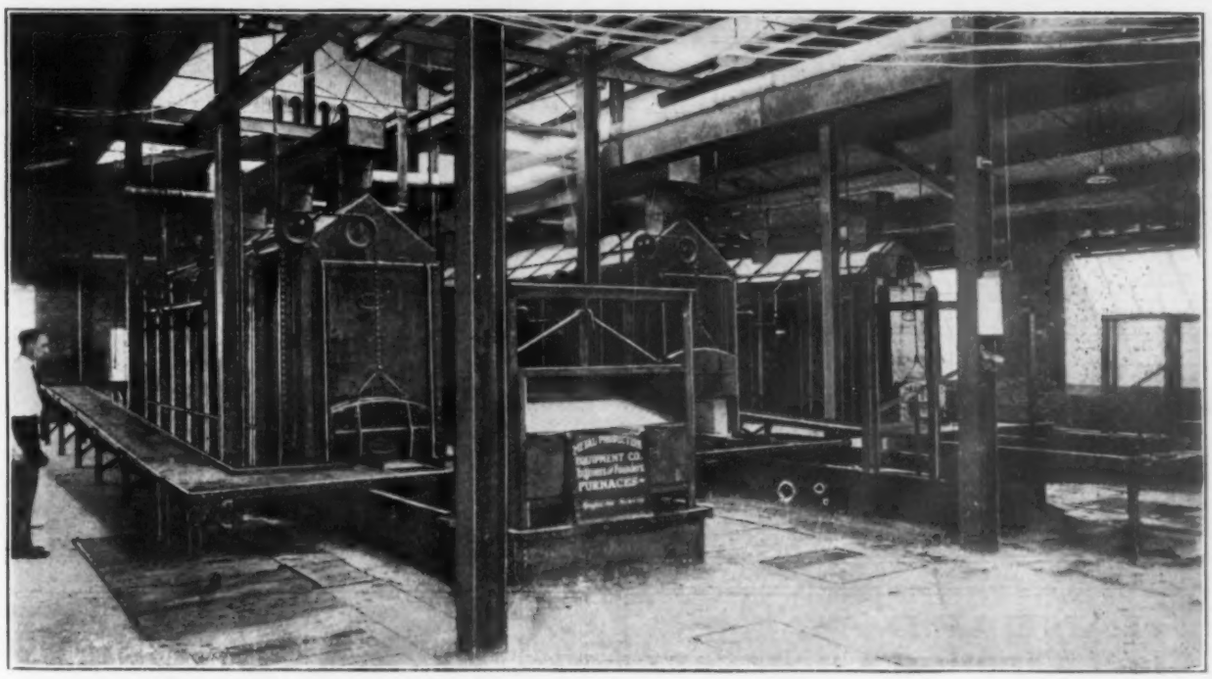
MPECo

Continuous Heat Treating Furnaces for Shells

OVERFIRED TYPE—OIL OR GAS FUEL



HEAT TREATING 155 MM. SHELLS



METALS PRODUCTION EQUIPMENT CO.

SUCCESSORS TO QUIGLEY FURNACE AND FOUNDRY CO.

165 Broadway (WORKS: SPRINGFIELD, MASS.) NEW YORK

PITTSBURGH ANNEALING BOX CO.

829 Beaver Ave., North Side PITTSBURGH, PA.

THE RAILWAY MATERIALS COMPANY
CHICAGO NEW YORK
FERGUSON SHOP FURNACES
FOR HEAT TREATING AND FORGING
AUTOMATIC OR CONTINUOUS
WILL REDUCE FUEL AND LABOR COSTS

Miccs TRADE MARK
OIL Furnaces
and Forges have increased the output by 50% without increasing costs. Let us give you details.
MIRCS FUEL OIL EQUIPMENT CO. LANCASTER, PA.

FUEL OIL FURNACES GAS
OIL AND GAS BURNERS
OIL PUMPS AND TANKS—BLOWERS AND COMPRESSORS
COMPLETE HEAT TREATING EQUIPMENTS
Economy Furnace Company
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CHICOPEE MASS.

ALBERT W. MOYER
ANNEALING FURNACES
SINGER BLDG. NEW YORK.

The Hawley Down Draft Furnace Co.
Builders of the Original Down-Draft Smokeless Furnace and the Hawley-Schwartz Metal Furnace
Formerly of Chicago. EASTON, PA.

THE A. HERMANSEN
Recuperative Furnace
Easily regulated. Maintains high and even temperature.
Absolutely complete or non-oxidizing combustion.
Guaranteed saving of 20 to 60% in fuel.
Woolworth Building, New York

Bellevue Furnaces
COVER THE ENTIRE INDUSTRIAL FIELD
THEY ASSURE THE USERS
HIGH QUALITY—LARGE PRODUCTION
See ad in last issue and in next issue
BELLEVUE INDUSTRIAL FURNACE CO., Detroit, Mich.



To secure 100% Economy and 100% Efficiency use W. N. Best oil and tar burners and furnaces for Annealing, Case Hardening, Tempering, Forging, Heat Treating, etc. Send for Catalog.
"There is nothing better than the Best"
W. N. Best, Inc. 11 BROADWAY NEW YORK CITY

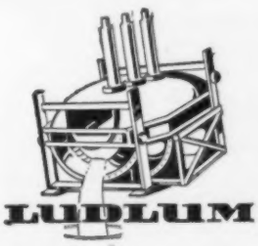
Rennerfelt Electric Arc Furnace
Operates on a new principle. Arc acts on the bath in a large flame. Widely used for making steel, melting brass, copper, nickel and ferro-manganese. Built in the following sizes: 300 lbs., 1000 lbs., one gross ton, 2 gross tons and 3 gross tons.
HAMILTON & HANSELL
3-21 Park Row, New York
Address Foreign Inquiries to A. B. ELEKTRISKA UNGAR, Stockholm, Sweden.

Strong Carlisle & Hammond
INDUSTRIAL FURNACES
SEND for Catalog 8-D showing furnaces for every requirement—75 standard types in all.
The Strong, Carlisle & Hammond Co.
Frankfort Ave. Cleveland, Ohio
Branches: Boston, Chicago, Detroit New York, Phila., Pittsburgh

Spencer Turbo-Compressors
For Use with Oil and Gas Furnaces
SEE OUR LARGE ADVERTISEMENT IN FIRST ISSUE OF EACH MONTH
The Spencer Turbine Cleaner Co.
Hartford, Connecticut

STANDARD
Heat Treating Furnaces
Used by the leaders in the auto world.
Write for our Catalogue
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New York Branch, 172-174 Fulton St.
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The General Combustion Company
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SPECIALISTS IN ECONOMICAL COMBUSTION OF LIQUID FUELS



Ludlum Electric Furnace

Ludlum Electric Furnace Corporation

New York City Chicago

GEHNRICH

INDIRECT HEAT OVEN CO., Inc.

MANUFACTURERS & PATENTEES

of the RADIATOR SYSTEM

for Japanning Enameling Lacquering

60-62 FRANKLIN AVENUE, BROOKLYN

SALES OFFICE CHICAGO

THE OVEN EQUIPMENT & MFG. CO.

NEW HAVEN, CONN.

"CRAWFORD SECTIONAL" OVENS Heated with Our ENCLOSED FLAME GAS BURNERS, or ELECTRICITY

Ovens Carried in Stock and Built to Meet Requirements of Manufacturers. Builders of All-Steel Oven Trucks with Roller Bearings

Cummer Coal Dryers

Insure Dry, Cool Coal; No Fires

Also Dryers for All Other Materials

THE F. D. CUMMER & SON CO., Cleveland, Ohio

THE STEINER

SECTIONAL AND PORTABLE OVENS

Direct or Indirect Heating

Superior Construction, Economical Operation

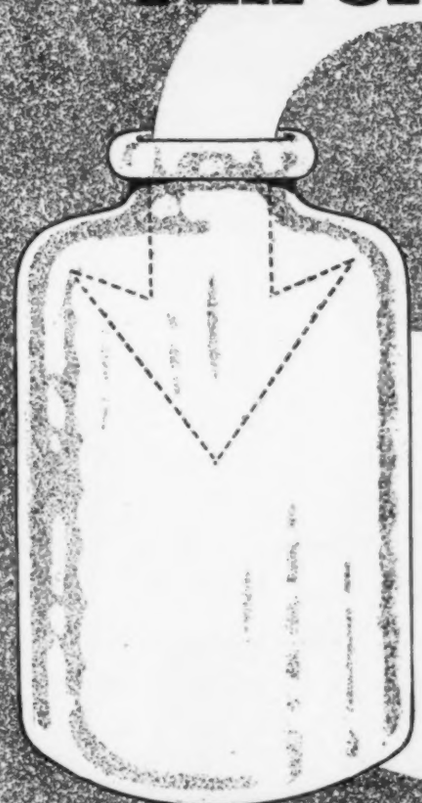
For Japanning, Lacquering, Drying and adaptable for many other purposes. Send for Catalogue.

E. F. STEINER & CO.

117-119 New Jersey Railroad Ave., Newark, N. J.



This Bottle is Full of Heat



—but you'll have to take our word for it.

And why not? Why not *take our word for it.* Don't you take somebody's "word for it" when you buy japanning enameling and drying ovens that are said to be "100% efficient, absolutely, positively, unconditionally"—and so on down the line of superlatives?

You soon discover, of course, exactly how much usable heat you are *using*, and how much you are *wasting*—but the discovery jolts your bank account considerably.

Now, there *is* a safe way to buy oven equipment. The following concerns have found it: American Multigraph Co., American Steel & Wire Co., Atlantic Refining Co., Buick Motor Co., Edw. G. Budd Co., Cadillac Motor Car Co., Chevrolet Motor Co., Cleveland Foundry Co., Curtiss Aeroplane & Motor Corp., Wm. Cramp & Son Ship & Engine Building Co., and a host others right thru the alphabet. Ask them or ask us.

Young Brothers Co. - Detroit, Mich.

315-341 Franklin Street

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W. H. Kelsey & Company, 1019 Citizens Bldg., Cleveland, O.
Milton Mill, Syndicate Trust Bldg., St. Louis, Mo.
John F. Robertson Co., Park Bldg., Pittsburgh, Pa.

10 Pounds of Coal Equal to 1 Gallon Fuel Oil



75 Pounds of Coal Equal to 1000 cu. ft. Natural Gas

46 SHEET AND PAIR FURNACES OPERATED WITH

PULVERIZED COAL HOLBECK SYSTEM

Now equipping 240 sheet and pair furnaces. Fuel consumption 300 pounds coal per ton of product

THE BONNOT COMPANY, CANTON, OHIO

INVESTIGATE NOW



Black Diamond Ovens

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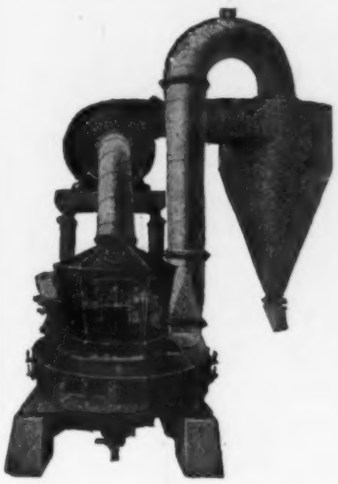
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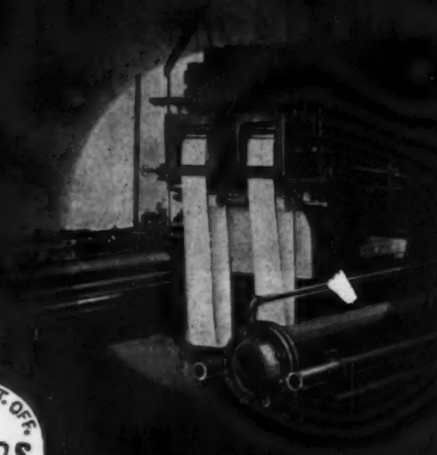
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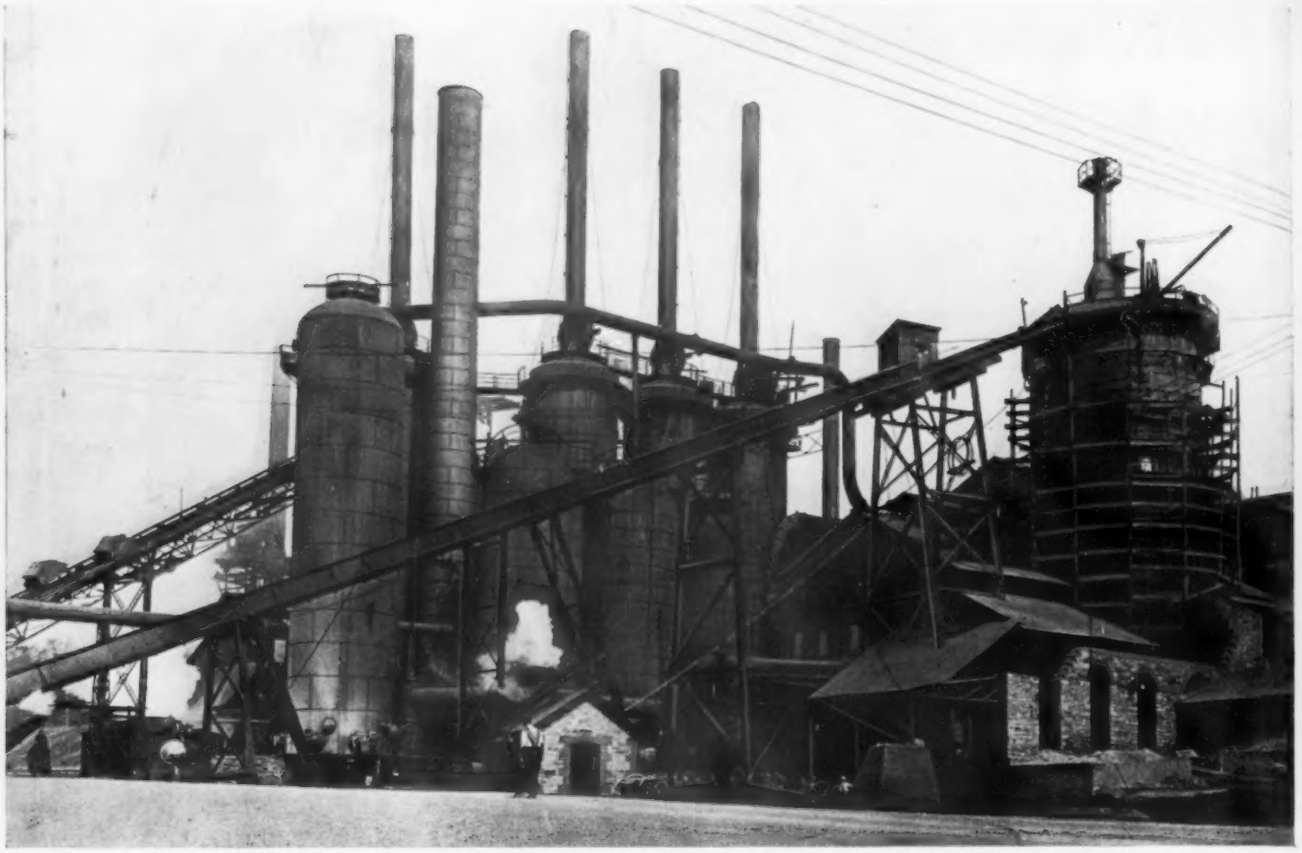
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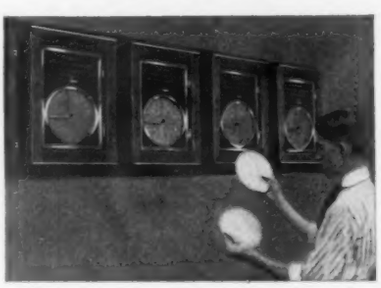
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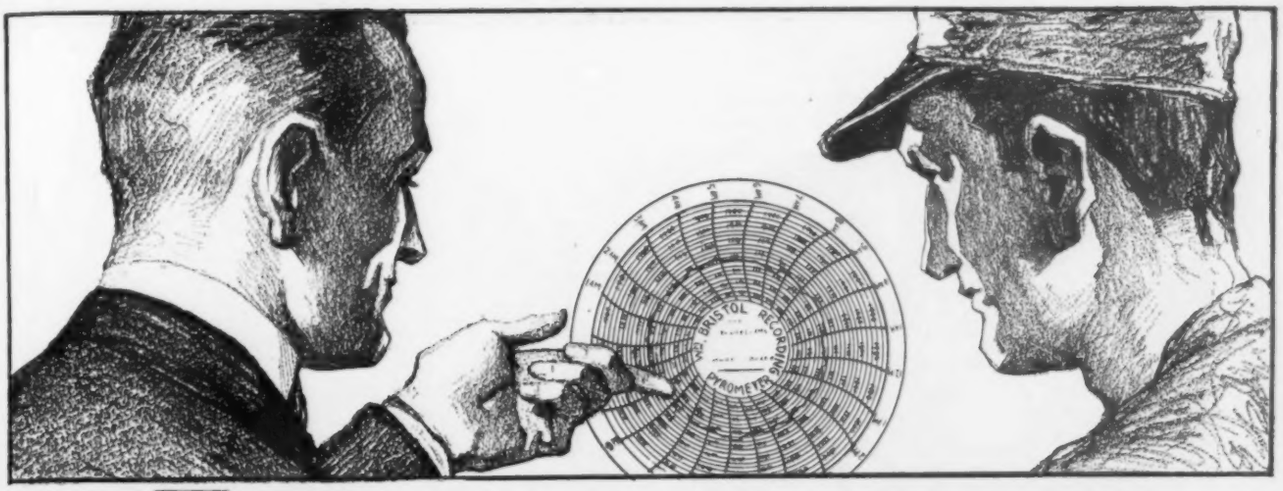




Fig. No. 659

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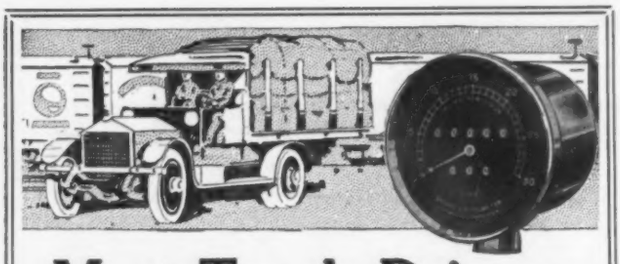


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P7

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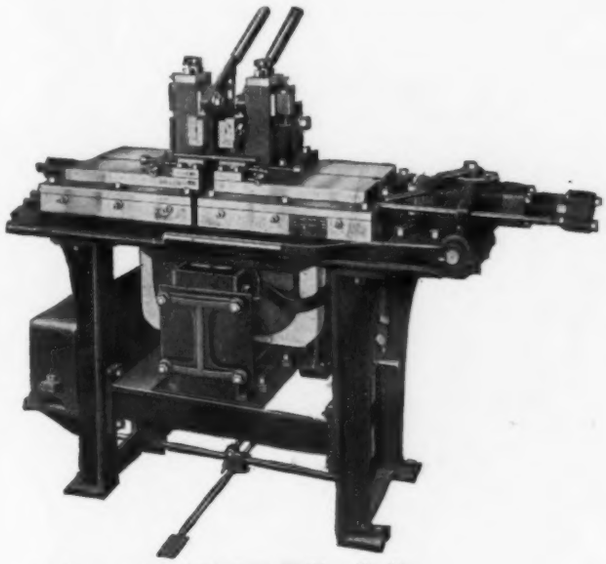
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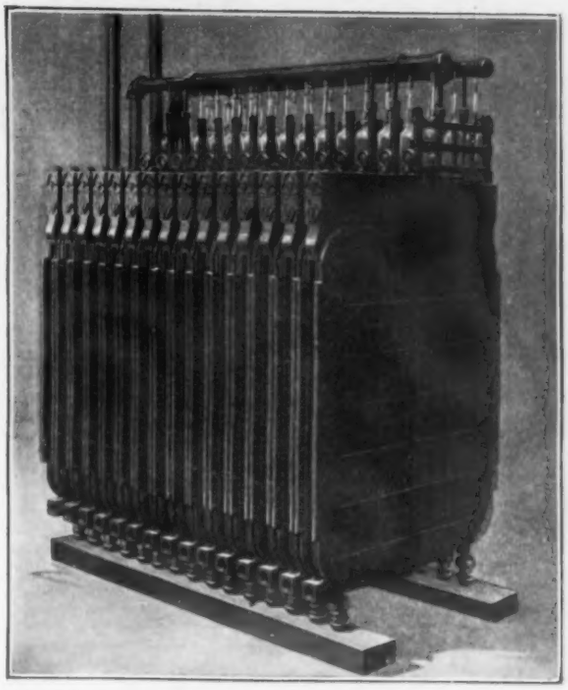
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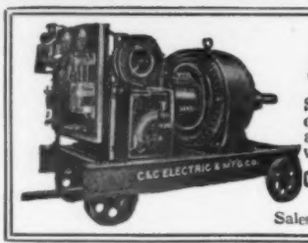
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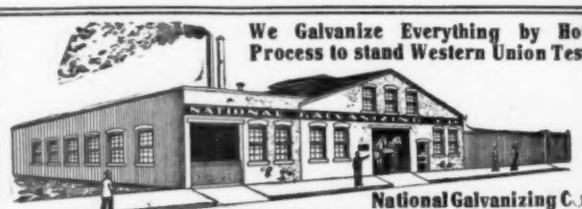
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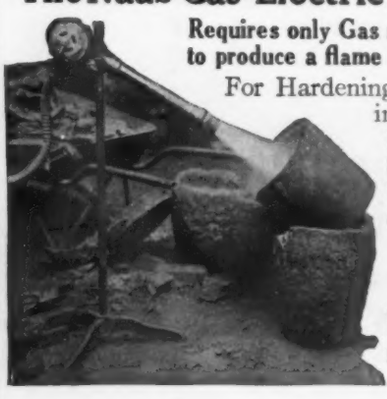
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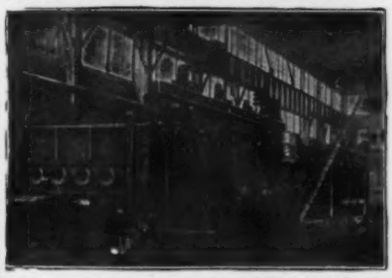


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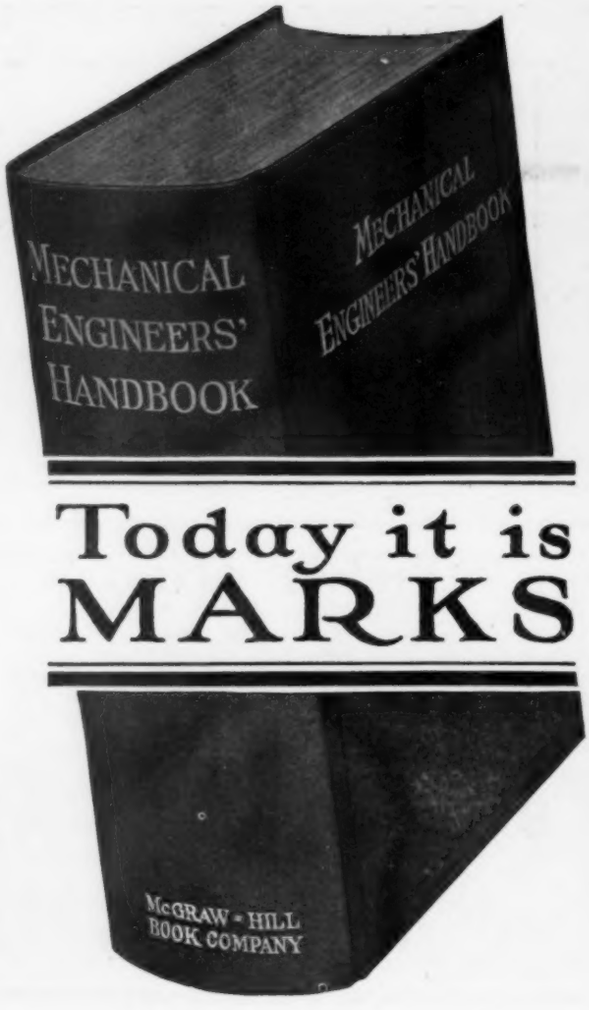
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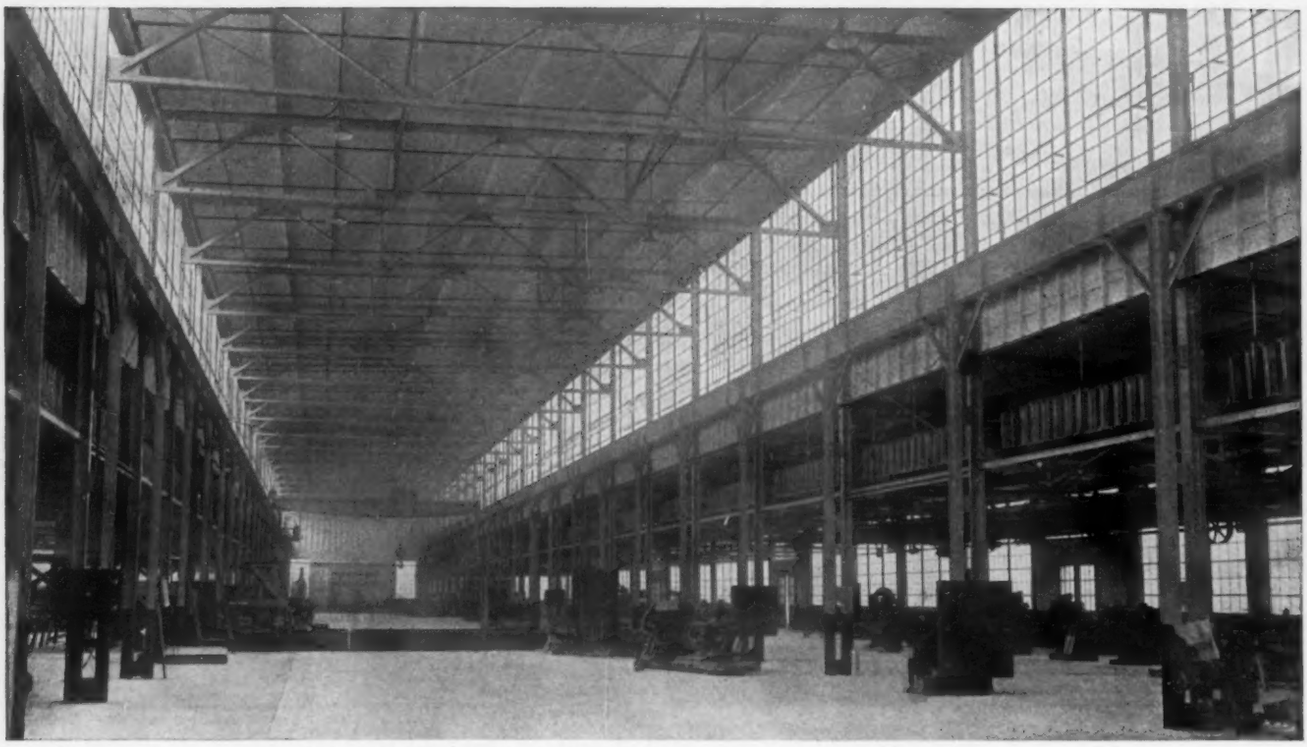

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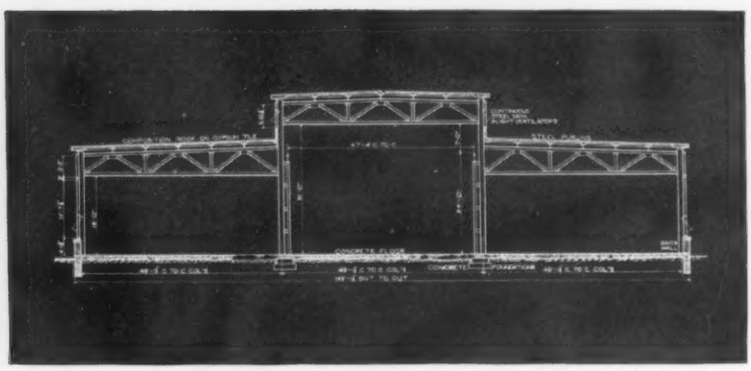
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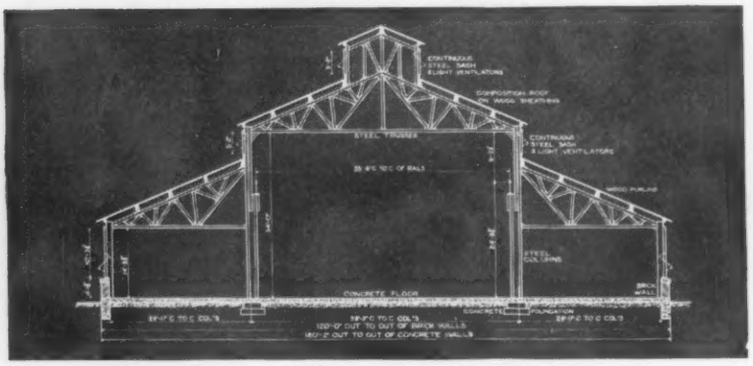
AUSTIN



This substantial Austin structure is now housing rush work somewhere in the U. S. A.



Cross-section of Austin No. 10 Standard. Height can be varied to suit requirements. Length to suit in multiples of 20 ft.



Cross-section of Austin No. 7 Standard with 60 ft. center aisle and side aisles of 30 ft. Built any length in multiples of 20 ft.

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This building is 150 ft. wide by 500 ft. long. The contract included heating, plumbing, wiring and crane runways. It was delivered broom-clean and with windows washed in Austin record time.

The following Austin proposal will give the same quick delivery of a permanent and substantial building.

> In 60 working-days *from date of your order* the Austin Company will deliver on a penalty-and-bonus contract any reasonable amount of building like that shown above—a completed building, broom-clean, windows washed, ready for useful occupancy.

This building is Austin No. 10 Standard. The accompanying cross-section shows further details. The standard width is 150 ft. with any length in multiples of 20 ft. The center aisle, with crane runways, is approximately 50 ft. wide. Side aisles are the same width, and they are provided with level suspension for shaft hangers.

The lower cross-section represents the typical Austin Standard Forge Shop and Foundry Building. It is built in three standard sizes: No. 5 Standard has 40 ft. center aisle; No. 6 Standard, 50 ft. center aisle, and in No. 7 Standard it is approximately 60 ft. wide. These buildings can be built any length in multiples of 20 ft., and are regularly furnished in 60 working-days.

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(44)

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But whatever the size of the building or the special character of the work, and whoever the owner, our constant purpose has been to make "Built by Aberthaw" a mark of distinction, to build our reputation into the structures and to give lasting satisfaction to their owners. Aberthaw organization, equipment and methods insure to you what they have given to others.

ABERTHAW CONSTRUCTION COMPANY

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6-48





Why Buy Skylights Which Inevitably Reach This End

The above picture shows a skylight in a sorry state of disintegration and illustrates very vividly how a skylight should NOT be built. What is the annual maintenance cost of such a skylight—to say nothing of loss of light, annoyance and danger? All this can be avoided by utilizing the permanent

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Booklet, "Foundry and Forge Shop Ventilation," tells more about Lupton Service and Products

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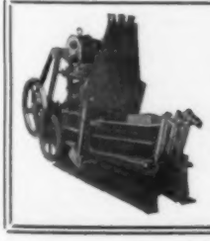
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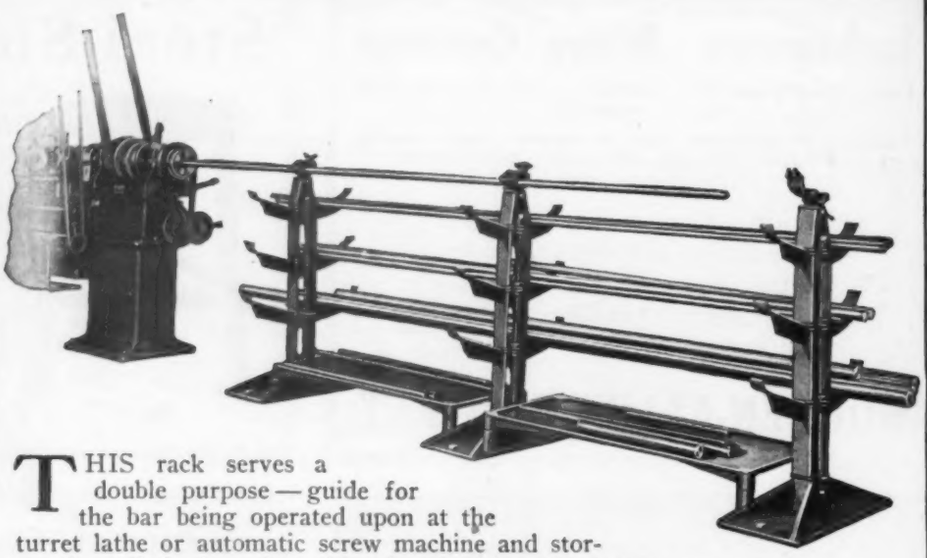
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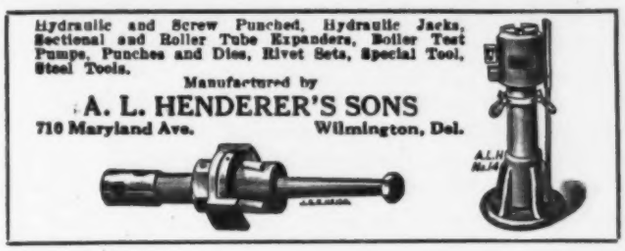
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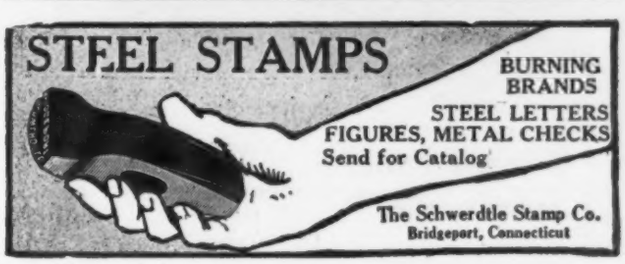
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Philadelphia, 523 Arch St.
Chicago, 169 N. May St.
Cleveland, 1547 Columbus Road.
Cincinnati, 212 Walnut St.

"Load and Look"

Automatic **Kron Scales** Springless

For Every Industrial Need

See Our Advertisement in June 20 Issue

American Kron Scale Co., New York City



Ample head room and it Straddles the Load

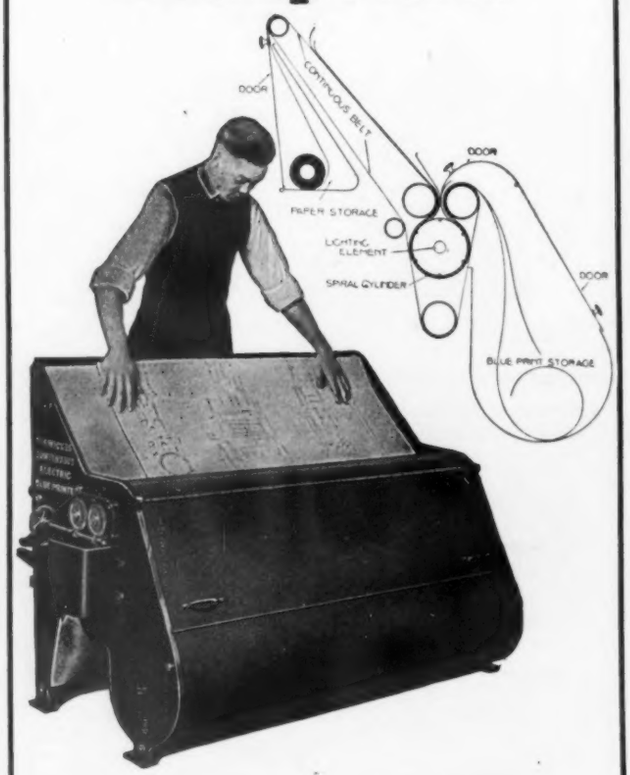
FRANKLIN PORTABLE CRANE

ALL GEARS covered and operator cannot be injured

May we submit a few facts on the Franklin?

FRANKLIN PORTABLE CRANE & HOIST CO.
FRANKLIN -:- PA.

Blueprints



Wickes Bros.
Saginaw, Mich.
U. S. A.

The Wickes
Continuous Electric. Sells at half the price. Uses half the current of others.

Accident Insurance



Attaching C O -Z Cleats to the kegs and casks you ship is a guarantee that your goods will **not** break open in transit—that they will reach the customer in perfect condition.

C O-Z Cleats can be attached in five seconds. They more than pay for their slight cost in time and nails saved. The biggest shippers and exporters are using them.

Remember, no more cooperage claims, shortages or annoyances if you use C O-Z Cleats.

Want a free sample cleat to test out for yourself?



Hubbard & Company

Stamping Dept. **Pittsburgh, Pa.**

Special Steel Stampings—Washers—Cotton Tie Buckles

Cary's Universal Box Strapping

In Many Widths and Gauges

Always Carried in Stock for Prompt Shipment



The only strapping on the market guaranteed to run true to width and gauge. It is made from an extra soft annealed steel of great tensile strength and nails can be driven thro' it with greatest ease.

Each reel contains 300 feet equipped with patent metal reel frame.

20 Reels Packed in a Case
Send for Samples and Prices

We also manufacture Hot and Cold Rolled Bands, Flat and Twisted Wire Box Straps, Box Corner Fasteners, Clasps, Seals, Corrugated Joint Fasteners, Hinges and Hasps, and Cary's EVERLASTING FLEXIBLE STEEL MATS.

Cary Manufacturing Co.

Manhattan Bridge Plaza **BROOKLYN, N. Y.**

The Champion Steel Pressure Blower

FOR

Foundry, Cupola, Furnaces, Forge Fires, Machine Shops, Etc.



Produces a strong blast at high pressure.

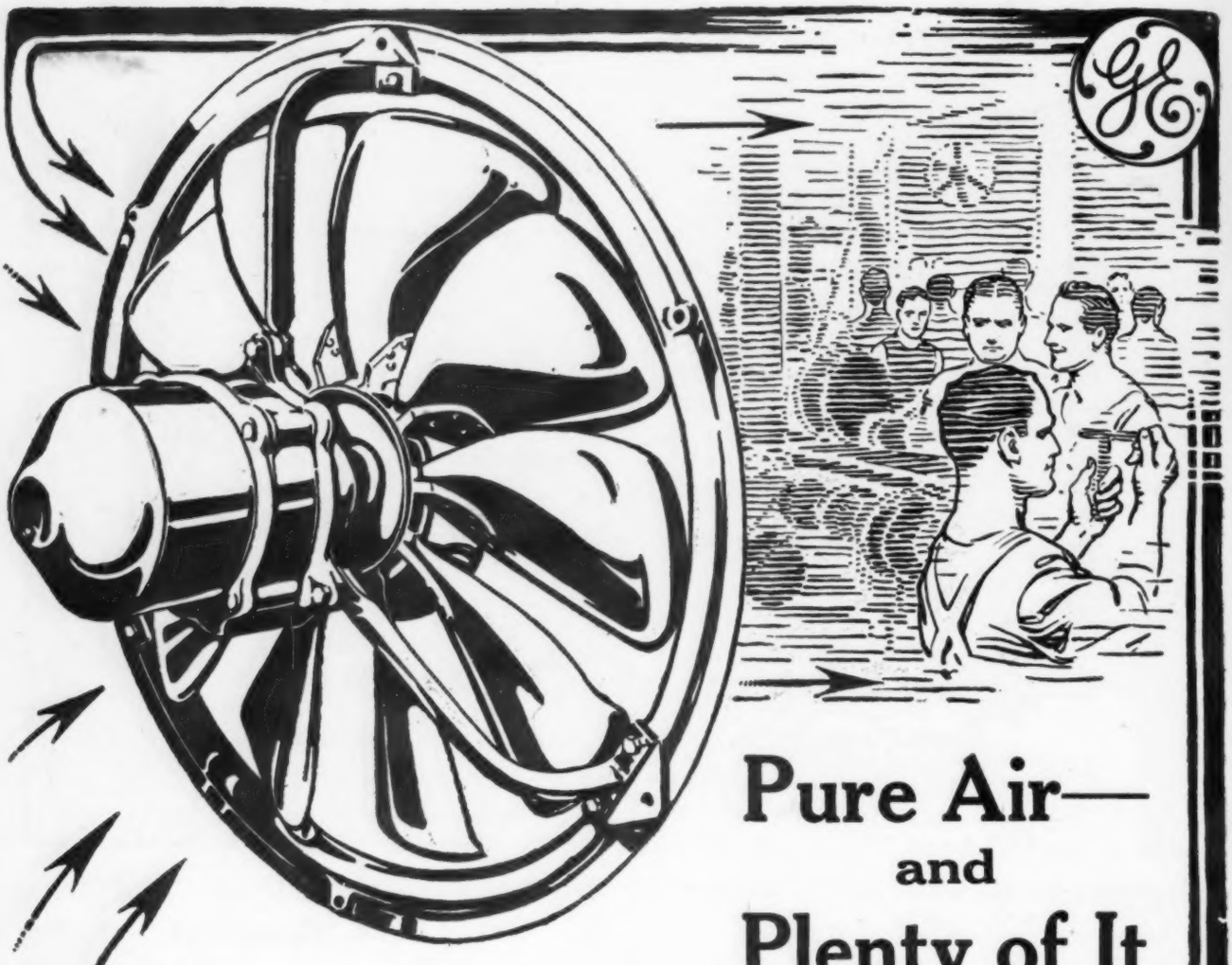
Built in various sizes up to 64 inches in height.

Also Fan Blowers, Exhaust Fans, and Steel Plate Planing Mill Exhausters.

Write for our 1918 Catalog.

The Champion Blower & Forge Company

Lancaster, Penna.



Pure Air—
and
Plenty of It

The employee does better work and more of it when the air he breathes is being constantly removed and renewed. His comfort is increased and his rate of fatigue appreciably reduced.

G-E Exhaust Fans

are a good investment—summer and winter. Their cost of operation is slight compared to the returns in health and in the "bracing up" of the workers. G-E Fans are well balanced and consequently run with little vibration and noise. Where varying amounts of air are required a simple control can be supplied which will vary the volume from 30% to maximum.

Order your fans before the sultry summer weather affects production.

Fans with diameters from 18″ to 48″ can be supplied for operation on direct or alternating current circuits.

General Electric Company

General Office: Schenectady, N. Y. **Sales Offices in All Large Cities**

45-18



Not Unusual, But Unique

The feat of a truck going from Buffalo, N. Y., to Fall River, Mass., is not marvelous—similar trips have been made before—perhaps under much more difficult conditions, but the remarkable thing about this trip is the purpose.

The American Printing Co. needed a truck—a good one—so they bought a Pierce Arrow. They already had on order five big No. 9 Buffalo "B" Volume Blowers—they needed them too, and badly—and the government needed cars more. So what was more natural than to have these Buffalo Blowers transported overland by the truck.

Buffalo Blowers and Exhausters are helping win the war.

BUFFALO FORGE CO., Buffalo, N. Y.

Sterling, Slow Speed, Low Power Blower Systems

For handling dust and refuse from POLISHING, BUFFING, GRINDING, WOOD WORKING and other MACHINERY.

STERLING BLOWER COMPANY

HARTFORD, CONN.

Branches: New York, Boston and Rochester.

Sirocco FANS AND BLOWERS

COOLING HEATING VENTILATING

AMERICAN BLOWER COMPANY,

DETROIT, MICHIGAN.



CLARAGE

FANS-BLOWERS HEATERS-ENGINES

CLARAGE FAN COMPANY

KALAMAZOO, MICH.

New York Cleveland Chicago

The Damascus Manufacturing Co.

See our ad 1st of each month

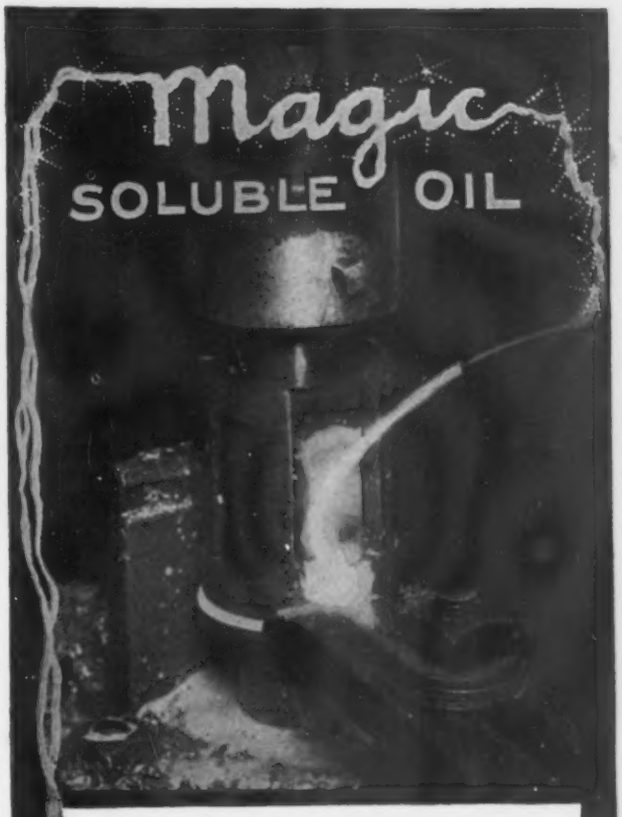
Cleveland, O.

Manufacturers

Soluble Oil
Cutting Oil
Cutting Compound
Gear Coatings
Greases

DAMASCUS

PRODUCTS OF QUALITY



Boosts Outputs

Magic Soluble Oil has been used for years on automatics, lathes, milling machines, drills, etc., and has proved that it cuts the costs of production and boosts outputs.

Magic Soluble Oil will not separate or evaporate when exposed to the air; it does not rust or gum the machine; it mixes perfectly with water; it does not soil or injure operator's hands or clothing.

It is clean and effective in keeping cutting tools cool and sharp. It has not one objectionable feature.

It is backed by almost 50 years' knowledge of the best that can be put into cutting lubricants.

Barrel sent on approval. Write today.

Fiske Bros. Refining Company

Manufacturers of the well-known MAGIC CUTTING COMPOUND and CLIMAX MINERAL LARD OIL.

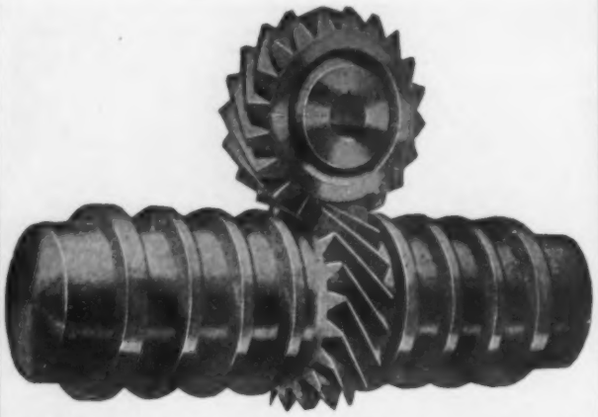
24 State Street, New York

Factories:

Newark, N. J.
Toledo, Ohio

Branches in large cities





Mystic Cutting Compound
The Old Reliable

This cut shows an operation performed with Mystic Compound, where Lard Oil was previously used.

MYSTIC

increased the speed 15% and cutter stood up 6 to 10 hours longer.

MAY WE DEMONSTRATE WHAT IT WILL DO FOR YOU?

Cataract Refining & Manufacturing Company

Eastern Department, No. 17 Battery Place, New York City, N. Y.
General Offices, Marine National Bank Bldg., Buffalo, N. Y.
Western Department, No. 17 So. La Salle St., Chicago, Ill.
PLANTS: BUFFALO—CHICAGO
Warehouses: Detroit, Boston, New York, San Francisco, Toronto, and London, Eng.



OILING SYSTEMS
OIL FILTERS

Oiling Devices; Shaft Oilers, Telescopic Oilers. Everything for reclaiming, distributing and applying lubricants to engines and machinery.

W. W. NUGENT & CO.
142-4 W. Superior St., Chicago
Established 1897
Send for 136-page catalog



MICHIGAN SIGHT FEED OILERS

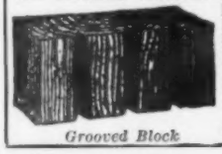
Insure Efficient Lubrication

used by machine tool builders everywhere. Write for catalog showing our complete line, including multiple oilers, all brass oilers, loose pulley oilers, oil gauges, brass cocks, pipe fittings, etc.

MICHIGAN LUBRICATOR CO.
DETROIT, MICHIGAN

Kreolite Wood Block Floors
They outlast the factory

An excellent investment for machine shops, warerooms, foundries, pickling rooms and other parts of the plant where the floors receive hard wear. Write today for our booklet "Factory Floors." See our page ad next week.


Grooved Block


Hex. Block

The Jennison-Wright Co.
2461 Broadway, Toledo, O.



SELL YOUR SECOND HAND MACHINERY
THROUGH THE CLEARING HOUSE SECTION OF
THE IRON AGE

Halve Your Oil Bills



Get at least double the use from your oil. Clean it by means of the

Cross Oil Filter

and use it over and over again.

The Cross positively frees the oil of all sediment, grit and filth, and keeps on doing it.

You can try the Cross for 30 days without obligation. Ask for details.

THE BURT MANUFACTURING COMPANY
Largest Manufacturers of Oil Filters in the World
231 Main Street AKRON, OHIO, U. S. A.
Also supplied by Oil Companies, Dealers and Power Contractors.

No Maintenance Cost

When a Century Creosoted Wood Block floor is laid all expense and cost is at an end. The initial cost is the only cost. Use and hard service improve it; the blocks are cool and dry—easy on the feet—and do not reflect the light.

Send for catalog.

CENTURY WOOD BLOCKS
THE FLOORING WITHOUT A FAULT

Pittsburgh Wood Preserving Co.
General Offices: Century Bldg. PITTSBURGH, PA.

Richard Solderless Bottom and Collar Oiler

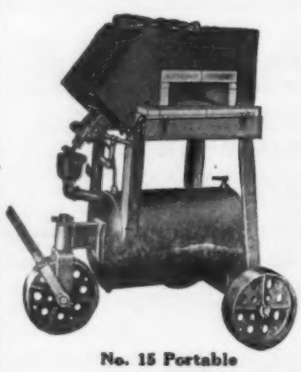


HERE is a squirt can that we guarantee second to none. It will withstand unusual abuse.

Prices and free sample to men in authority on request.

Send out a Good Oiler with your tool equipment

Ansonia Novelty Co.
Ansonia, Connecticut



MAHR

OIL-FUEL RIVET FORGES

Insure against scaly, imperfectly heated and burned rivets.

Write for descriptive matter.

No. 15 Portable

MAHR MFG. CO.
MINNEAPOLIS, MINN.

The Buying Unit*

Circulation of The Iron Age Illustrated



THIS illustrates the plant of the Syracuse Chilled Plow Company, Syracuse, N. Y., covering three city blocks and having a floor space of 13 acres. Products: Plows, Harrows, Cultivating Tools, Manure Spreaders and Drag Scrapers. They operate two large foundries, using 10,000 tons of pig iron and scrap, 7,500 tons of coke and coal per year. They also use 4,000 tons of steel, 1,500 tons of malleable irons and about 4,000,000 bolts annually.

The following men in this plant read THE IRON AGE every week:

Mr. J. H. MILLER . . Superintendent
Mr. L. F. TIFFT . . Purchasing Agent
Mr. W. BOWER . . Master Mechanic
Mr. W. H. LEE . . . . . Designer

*This is No. 175 of a series of advertisements showing the various classes of manufacturing firms which subscribe to The Iron Age



Part of a 15,000-yd. installation of A and L Wood Block Floor in Hydraulic Pressed Steel Plant, Cleveland

A and L
INTERIOR
WOOD BLOCK FLOORS

The War On Waste

Not only must we save food and money. Conservation must extend to Time, Labor and Material if this country is to reach the highest limit of its productive capacity demanded by the exigencies of war. Any measures, therefore, you may take to increase the output of your plant should include consideration of A and L Interior Wood Block Floors.

To Save Time—because their permanently smooth surface helps forward the rapid movement of material.

To Save Labor—because they are "easy on the feet," thus sparing workmen from much unnecessary fatigue.

To Save Material—because their cushion-like quality protects castings and tools from being broken, chipped or cracked in falling.

In addition to these advantages A and L Wood Block Floors cost little or nothing for repairs. Every day of service increases their value to you.

Our booklet "FLOORS" gives further facts and illustrates wide range of usefulness. Gladly sent on request

Ayer & Lord Tire Company
Incorporated

Railway Exchange **Chicago**

New York, 2 Rector Street
Cleveland, 201 Society for Savings Bldg.
Detroit, 406 Empire Bldg.
Philadelphia, 902 Land Title Bldg.

Strangling the Periodicals

CONGRESS at its last session passed a hasty postal law increasing the postage on periodical from FIFTY TO NINE HUNDRED PER CENT THROUGH A POSTAL "ZONE" LAW. *The postal "zone" system was abolished by Abraham Lincoln in 1863 on the recommendation of Postmaster General Blair and has since also been condemned by U. S. Postal Commissions.*

Under the postal zone law some periodicals will be killed—all will be crippled. There will be fewer readers, and the habit of reading curtailed. The great functions of periodicals is to assist in the spread of ideas—by printing the achievements in the world of thought, culture, and science.

Thus to shut out farm journals—as these zone rates will—will lessen the productive power of our country by millions of dollars through loss of better methods. Shut off trade journals and you decrease the manufacturing power by more millions. Shut off the religious papers and there are shut off channels that have raised millions of dollars for distressed humanity. Shut off the great periodicals of the home and there is throttled an avenue that has given expert instruction to hundreds of thousands of mothers and saved their babies to health and citizenship.

These national periodicals are printed in the big cities—and the first zone, the cheapest zone, is in or near those cities; there are many educational opportunities near cities, and the cities will read anyway. Small towns and distant districts depend to a large extend upon periodicals; thus this law increasing periodical postage where it is most needed shuts off opportunity where needed. It penalizes periodical readers.

Congressman Claude Kitchin of North Carolina, who fathered it and compelled its adoption, refusing hearings on the measure—it had been twice defeated by the Senate—stated in his speech in Congress that it was **not** a War Revenue amendment **but permanent postal legislation.**

Canadian magazine readers, even to the Arctic Circle, can receive American magazines at four cents a pound postage. Every American reader—if they live west of Missouri—**must pay almost twice as much postage, or from 4½ to 8 cents postage per pound for the same magazines!** This is what the postal "zone" law means—discrimination against American citizens of all Western States. Do you live West of Missouri—of Minnesota, Iowa, Arkansas or Louisiana? Then this postal "zone" law discriminates against you and in favor of every Canadian reader to the shores of the Pacific and North to the Arctic Circle!

Will you help—Sign NOW.
It is not a War Tax. It is postal legislation, pure and simple.

Repeal this law. Repeal this FIFTY TO NINE HUNDRED PER CENT periodical postage increase with its unfair, iniquitous and disastrous "zone" system. Sign the petition below and mail it. Put a cross mark in the square—save the periodicals and the work which they have done and are doing for national education and patriotism.

PETITION TO CONGRESS—Sign Here!

The spread of education, of culture, of scientific knowledge and advancement, and of our vast internal merchandising and manufacturing has been, and always is, vitally dependent upon the freest and cheapest circulation of periodicals. The penalties resulting from any restriction on the freest possible circulation of periodicals will be destructive of the best interests of our economic life and the opportunities of developing our best citizenship.

The postal amendment passed by the last Congress increasing the postage on periodicals from FIFTY TO NINE HUNDRED PER CENT with its postal "zone" system will throttle or destroy our periodicals at a time when the widest and most extensive circulation of publications is essential to the patriotism, education, and upbuilding of our country.

Therefore, I, the undersigned, do most earnestly demand the repeal of this burdensome periodical postage amendment.

Name .....

City or Country .....

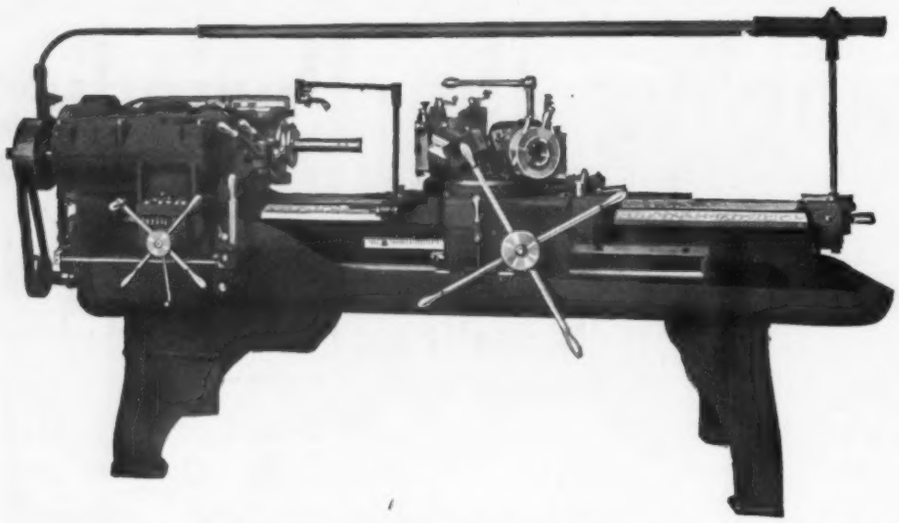
Street Address .....

State .....

Periodicals means much in your life. If you will help by a few arguments with your acquaintances and an occasional letter to your Congressman in a spare moment, put a cross mark here.

Will you help in securing the repeal of this iniquitious law? ☐

CUT OUT. MAIL TO CHARLES JOHNSON POST
Room 1417, 200 Fifth Avenue, New York City



THE BEST KNOWN MACHINE IN THE WORLD

for bar and chuck work of medium size is the Hartness Flat Turret Lathe. It was the first to invade the shaft turning field of the engine lathe, and it remains the first in reputation and accomplishment.
It was the first to apply rigid construction and efficient speed and feed manipulation to chucking work, and here also it remains first in reputation and accomplishment.
On both bar and chucking work it performs the maximum of work with the minimum of capital expense for machine and tools. It is the unrivalled dividend producer.

Jones & Lamson Machine Company

Springfield, Vermont, U. S. A., and Queen Victoria Street, London, E. C.

Foreign Agents:

Germany, Holland, Switzerland and Austria-Hungary—M. Koyemann, Charlottenstrasse 112, Dusseldorf, Germany.
France, Spain, Belgium—F. Auberty & Co., 91 Rue de Maubeuge, Paris.

LIEBER'S CODE USED.

PIG IRON

Iron Ore Coal Coke

M.A. HANNA & CO. *Sales Agents*

CLEVELAND—Pittsburgh—Toronto—Buffalo—Detroit

M·A HANNA & Co

THE MALLEABLE IRON FITTINGS CO.

Branford, Conn.

recommend their Air Furnace Refined VANADIUM IRON for piston heads or rings, high pressure fittings, and cylinders.

TOUGH, SOUND and DENSE with HIGH TENSILE STRENGTH

Careful attention given to special requirements

QUALITY



New Departure Ball Bearings

Here are a few of many reasons for the QUALITY of this ball bearing:

Because it is of chrome alloy steel tubing specially made for us and *the best that money and skill can produce.*

Because our manufacturing processs exact dimensions that are accurate to a ten-thousandth part of an inch or *one-thirtieth the thickness of a human hair.*

Because each bearing is tested seventy-eight times during its development by precise instruments that assure maximum quality and accuracy.

Because the steel balls are made by ourselves from the best chrome alloy steel procurable and are insistently tested for strength, sphericity and uniformity of size.

The quality of New Departure ball bearings is the reason for their extensive use in automobiles, motor trucks, aeroplanes and all kinds of machinery.

THE NEW DEPARTURE MANUFACTURING COMPANY, BRISTOL, CONN.

Conrad Patent Licensee.

346-A

Current Metal Prices

On Small Lots, from Merchants' Stocks, New York City

The quotations given below are for small lots, as sold from stores in New York City by merchants carrying stocks.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipment in carload lots from mills, these prices are given for their convenience.

On a number of articles the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE under the general headings of "Iron and Steel Markets" and "Metal Markets."

Iron and Soft Steel Bars and Shapes

	Per lb.
Refined iron:	
1 to 1⅞ in., round and square	4.695c
1½ to 4 in. x ⅜ to 1 in.	4.695c
1¼ to 4 in. x ¼ to 5/16 in.	4.895c
Burden's H. B. & S. bar iron, base price	6.20c
Burden's Best bar iron, base price	6.40c
Norway Bars, base price	12.00c
Soft Steel:	
¾ to 1⅞ in., round and square	4.095c
1 to 6 in. x ⅜ to 1 in.	4.095c
1 to 6 in. x ¼ and 5/16	4.195c
Rods—⅝ and 11/16	4.195c
Bands—1½ to 6 x 3/16 to No. 8	4.945c
Shapes:	
Beams and channels—3 to 15 in.	4.195c
Angles:	
3 in. x ¼ in. and larger	4.195c
3 in. x 3/16 in. and ⅛ in.	4.445c
1½ to 2½ in. x ⅛ in.	4.245c
1½ to 2¾ in. x 3/16 in. and thicker	4.195c
1 to 1¼ in. x 3/16 in.	4.245c
1 to 1¼ in. x ⅛ in.	4.295c
⅞ x ⅛ in.	4.345c
¾ x ⅛ in.	4.395c
⅝ x ⅛ in.	5.195c
½ x 3/32 in.	5.895c
Tees:	
1 x ⅛ in.	4.595c
1¼ in. x 1¼ in. x 3/16 in.	4.495c
1½ to 2½ x ¼ in.	4.295c
1½ to 2½ x 3/16 in.	4.295c
3 in. and larger	4.745c

Merchant Steel

	Per lb.
Bessemer machinery	4.095c
Tire	4.095c
Toe calk	5.70c
Open-hearth spring steel	7.50c
Standard cast steel, base price	15.00 to 16.00c
Extra cast steel	18.00 to 20.00c
Special cast steel	23.00 to 25.00c

Tank Plates—Steel

¼ in. and heavier	4.445c

Sheets

Blue Annealed

	Per lb.
No. 8 and 3/16 in.	5.395c
No. 10	5.445c
No. 12	5.495c
No. 14	5.545c
No. 16	5.645c

Box Annealed—Black

	One pass, C. R. Wood's soft steel, per lb.	Wood's refined, per lb.
Nos. 18 to 20	6.245c	——
Nos. 22 and 24	6.295c	7.55c
No. 26	6.345c	7.60c
No. 27	6.395c	——
No. 28	6.445c	7.75c
No. 29	6.495c	——
No. 30	6.595c	——
Genuine Russia, as per assortment	22½ @ 25c	
Patent planished, W. Dewees Wood,	A 11 to 11¾c; B 10 to 10¾c net	

Galvanized

	Per lb.
No. 14	6.795c
No. 16	6.945c
Nos. 18 and 20	7.095c
Nos. 22 and 24	7.245c
No. 26	7.395c
No. 27	7.545c
No. 28	7.695c
No. 30	8.195c

No. 28, 36 in. wide, 10c. higher.

Corrugated Roofing, Galvanized

2½ in. corrugations, 10c. per 100 lb. over flat sheets.

Tin Plates

Charcoal Plates

	Per box
AAA charcoal:	
IC 14 x 20	Nominal
IX 14 x 20	Nominal
A charcoal:	
IC 14 x 20	Nominal
IX 14 x 20	Nominal

Coke Plates—Bessemer

IC 14 x 20, 107 lb.	Nominal
IX 14 x 20	Nominal

Terne Plates

IC 20 x 28 with an 8-lb coating	Nominal
IX 20 x 28 with an 8-lb. coating	Nominal

Brass Tubes, Rods and Wire, and Copper Tubes

Manufacturers have withdrawn all quotations because of unsettled prices of raw materials and will only name prices to actual buyers.

Copper Sheets

Sheet copper, hot rolled, 16 oz. (quantity lots), base price, per lb., 32½c. net from mill; 34c. from stock.

Cold rolled, 14 oz. and heavier, 1c. per lb. advance over hot rolled.
Polished, 20 in. wide and under, 1c. per sq. ft. extra; over 20 in. wide, 2c. per sq. ft. extra.
Planished copper, 1c. per sq. ft. more than polished.
Tinning, one side, 5c. per sq. ft.

Copper Wire

	One pass, C. R. Wood's
Base price, at mill	Nominal

Tin

	Per lb.
Straits pig	Nominal
Bar	Nominal

Copper

Lake ingot	24.675c
Electrolytic	24.675c
Casting	24.675c

Spelter and Sheet Zinc

Western spelter	10c to 11c
Sheet zinc, No. 9 base, casks	17c; open 17½c

Lead and Solder*

American pig lead	8¾c to 9½
Bar lead	10 to 10½
Solder, ½ & ½ guaranteed	73c
No. 1 solder	63½c
Refined solder	52½c

*Prices of solder indicated by private brand vary according to composition.

Babbitt Metal

Best grade, per lb.	$1.10
Commercial grade, per lb.	70c

Antimony

Asiatic	16c to 18c

Bismuth

Per lb.	$4.50 to $5.00

Aluminum

No. 1 aluminum (guaranteed over 99 per cent, pure), in ingots for remelting (carload lots), f.o.b. mill, per lb.	32.10c
In small lots	40 to 45c

Old Metals

Dealers' purchasing prices paid in New York are as follows:

	Cents Per lb.
Copper, heavy and crucible	22.00
Copper, heavy and wire	21.00
Copper, light and bottoms	19.00 to 19.50
Brass, heavy	13.25 to 13.75
Brass, light	10.25 to 10.50
Heavy machine composition	22.00 to 22.25
No. 1 yellow brass turnings	12.50 to 13.00
No. 1 red brass or composition turnings	18.50 to 19.00
Lead, heavy	6.50
Lead, tea	5.25
Zinc	5.75

"————————Files"

(It's easy to supply the missing word).

Nicholson, of course.

And why Nicholson? Because they are the recognized standard. Experienced file users know that should a Nicholson File fail to do the job, there is no other make of file will do it.

Nicholson Files have won their way because of uniform quality, fine workmanship, durable cutting edges and dependable service.

The Nicholson Increment Cut Files are used for all ordinary work, and our X-F Swiss Pattern Files for especially fine work.

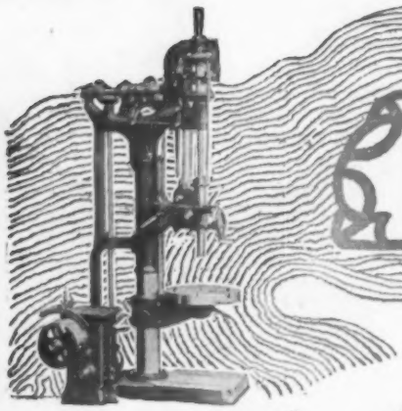
Write for complete catalog and copy of "File Filosophy"



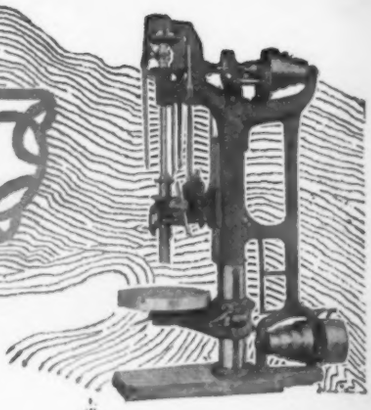
Nicholson File Company

Providence, R. I., U. S. A.





THE CINCINNATI UPRIGHT DRILLING MACHINES



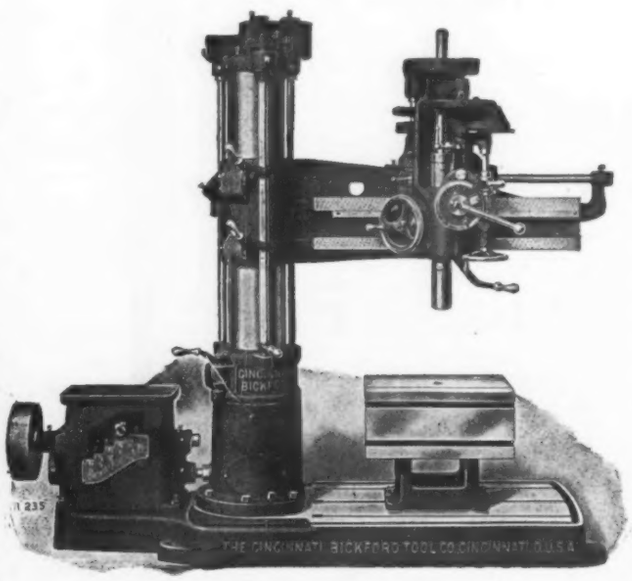
Convenience

CONVENIENCE—ease of operation—is one of the features which make a large output possible on Cincinnati Bickford Radial Drilling Machines.

The simple control of the speeds, the feeds, the easy setting of the depth gauge, the easily operated quick return—all of these conveniences save a considerable part of the operator's time on each piece of work.

In the busy machine shops where every minute counts, the time-saving features of Cincinnati Bickford Radial Drilling Machines are appreciated.

Our circulars give complete data.



Cincinnati Upright Drilling Machines

In addition to the Cincinnati Bickford Radial Drilling Machine illustrated, we manufacture the Cincinnati Upright Drilling Machines in various sizes. In most plants these tools have become the standard by which other drills are adjudged with regard to workmanship, design and efficiency.

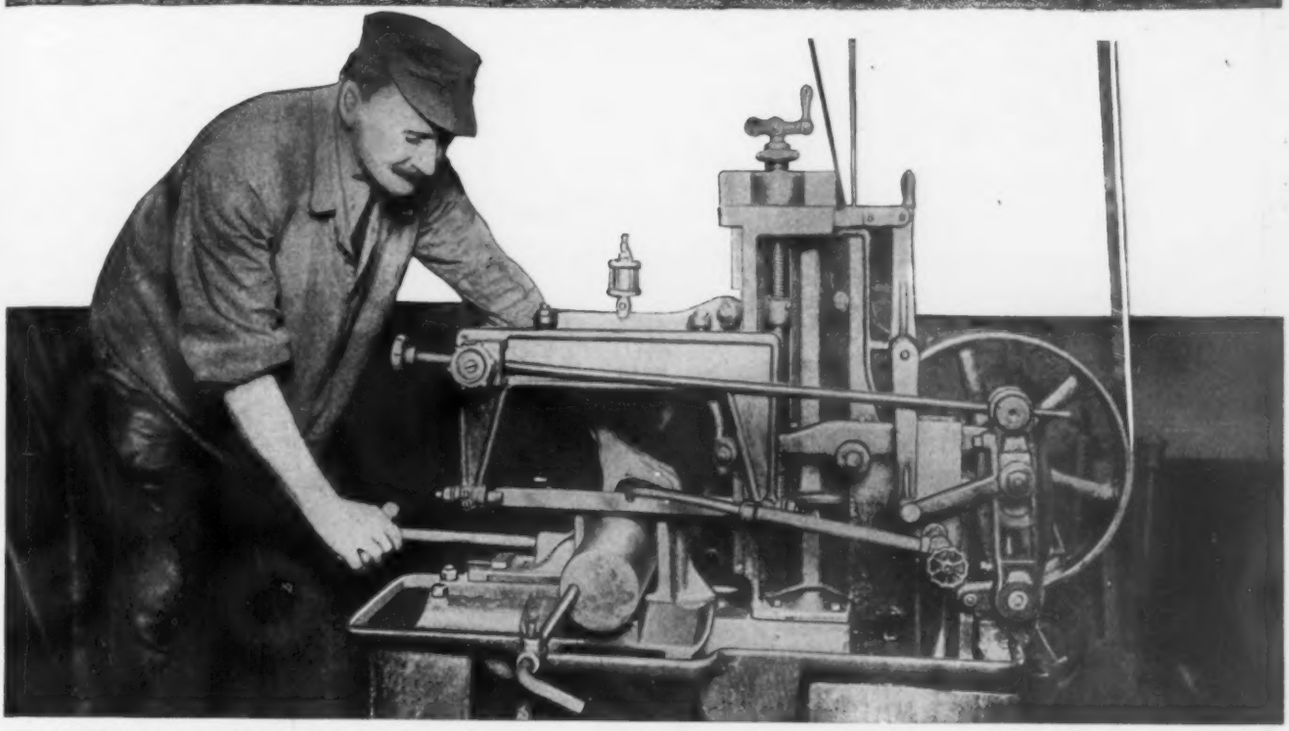
The Cincinnati Bickford Tool Co.

Oakley, Cincinnati, Ohio



THE CINCINNATI BICKFORD RADIAL DRILLING MACHINES

U. & R. 234



SIMONDS

Blades on a Power Hack Saw

THREE conditions govern every Hack Sawing job; the machine, the material, and the blade. When the first two are neglected it does not make much difference what kind of a blade you use. But when machine and material conditions are understood and the proper size blade is selected ***then you will notice,*** beyond a doubt, ***the extra wear*** and ***the quicker cut*** obtained ***with a Simonds blade.***

We will be glad to discuss with you the question of proper blades for different kinds of work.

SIMONDS MANUFACTURING COMPANY

"The Saw Makers"

FITCHBURG, MASS.

17th St. & Western Ave. CHICAGO, ILL

St. Remi St. & Acorn Ave. MONTREAL, QUE.

NEW YORK CITY
SAN FRANCISCO, CAL.
NEW ORLEANS, LA.
SEATTLE, WASH.
LOCKPORT, N. Y.
MEMPHIS, TENN.
VANCOUVER, B. C.
LONDON, ENGLAND
PORTLAND, ORE.
ST. JOHN, N. B.



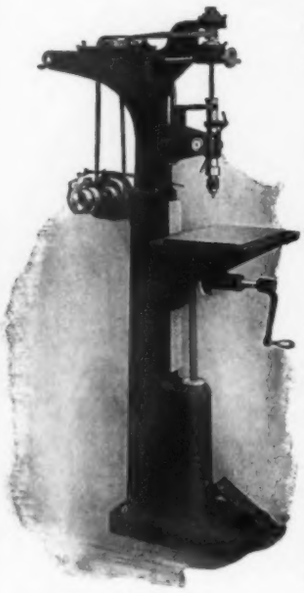
Silver's 25" Drilling Machine

A strong, speedy 25-in. drill designed for light and heavy work of all kinds. Its accuracy and convenience appeal to employer and employee alike. Our new machinery catalog No. 63 covers these and our entire line. Send for a copy.

The Silver Mfg. Co., Box 395 **Salem, Ohio**

Manufacturers of 20" drills, single column or gangs of 2, 3 and 4.

Before Ordering Additional Drilling Machines



No. ½ Avey

to handle your increasing orders, look into the production possibilities of the

Avey

Ball Bearing Drilling Machine

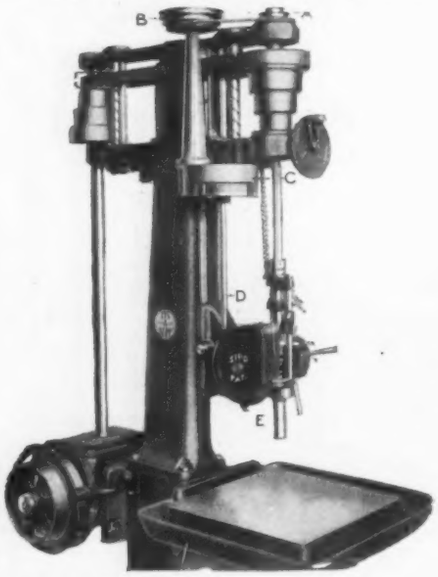
It may be had with 1 to 6 spindles and in either bench or column type. It is constructed throughout with the best grade of annular ball bearings that withstand excessive speeds.

A high class machine with many conveniences that save the operators time.

No. ½ Avey—With 1 to 6 spindles. Capacity ⅜". Speeds up to 12000 r.p.m. Overhang 6¼". Drills to center of 12½" circle.

The Cincinnati Pulley Machinery Co., Incorporated

Cincinnati Ohio



66% SAVING

A USER OF

The Sipp Drill with Power Feed

reports a saving of 66% over old-style drill he had been using. This difference was largely due to the *different* Sipp Power Feed. It is unique. Write for details.

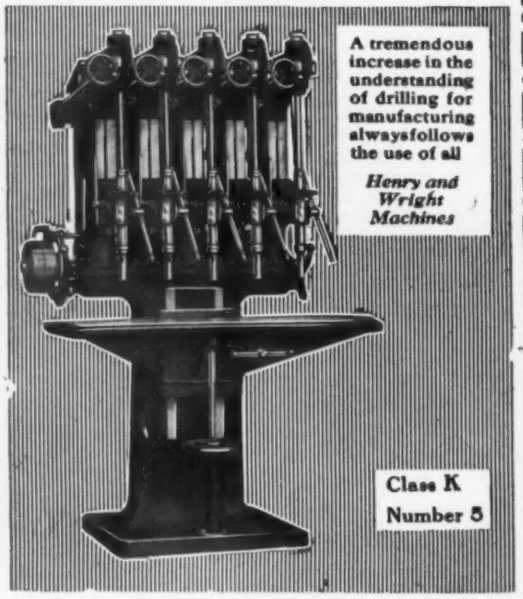
The Sipp Machine Co.

Warren Street, Paterson, N. J.

ITS A SIPP TRADE MARK

HENRY & WRIGHT

Drilling Machines



THE HENRY & WRIGHT MFG. CO.

HARTFORD, CONN.

OVER-SEAS REPRESENTATIVE

ALMACOA ALLIED MACHINERY COMPANY OF AMERICA ALMACOA

120 BROADWAY, NEW YORK, U.S.A.

Paris, Turin, Zurich, Barcelona

"Better Drilling and More of It"



No. 101 Radial Drill Furnished with
2½ or 3½ Foot Arms

That's the principle on which our drills are built. Every detail is given careful consideration so as to increase their productiveness and ability to drill accurately. The illustration shows the massiveness and simplicity of their design, the large table, and sturdy post on which the arm swings, and the table is raised or lowered as the operator wishes.

The head moves freely across the arm which enables it to handle a wide range of drilling.

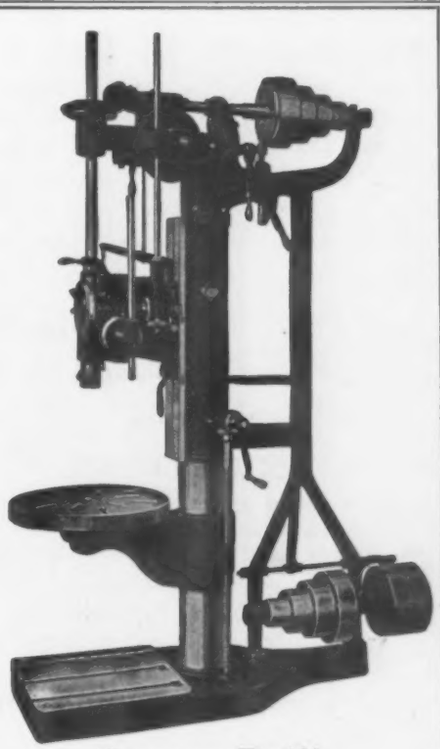
Our catalog contains description, prices and advantages of this drill. Write for your copy now; it contains facts you should know of.

Canedy-Otto Mfg. Co.
Chicago Hts., Ill.

Complete Line of 8 inch to 50 inch Swing (with or without Tapping Attachment)

Upright DRILLS
Horizontal DRILLS
Gang DRILLS

Accuracy—Strength
Convenience of Operation



Made by **Barnes Drills**

TRADE W.F. J.B. MARK

W. F. & JOHN BARNES CO.
69 Ruby Street ROCKFORD, ILL., U. S. A.



Geared Throughout

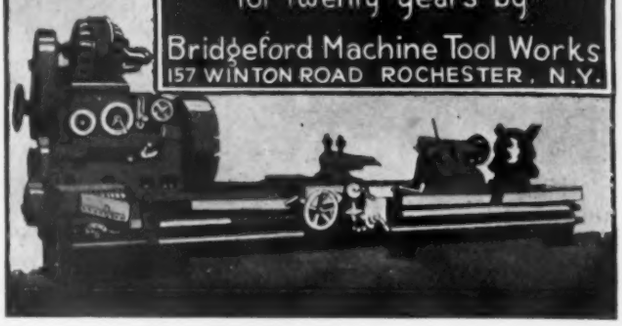
8 Feeds, 8 Speeds

Changes of speeds and feeds are made without the slightest loss of power or time. The tapper is geared throughout.

Further economy is found in the self-oiling feature, which prolongs the life of the tapper.

Barnes Drill Co.
815-31 Chestnut Street
Rockford, Ill.

BRIDGEFORD HEAVY DUTY LATHES
Manufactured in Rochester for twenty years by
Bridgeford Machine Tool Works
157 WINTON ROAD ROCHESTER, N.Y.



DRILLING MACHINERY

FULL BALL BEARING
HIGH SPEED AND HEAVY DUTY
ONE TO SIX SPINDLES
HIGH-SPEED AND HEAVY-DUTY TAPPERS

Leland-Gifford Co. Worcester, Mass.

SIDNEY for SERVICE

LATHES

of the better grade, built to withstand the shocks and strains of heavy work and to boost your production to its utmost at a minimum cost. Their perfect alignment assures accurate work. You should investigate. Send for catalog.

THE SIDNEY TOOL CO., Sidney, Ohio

HAMMOND HIGH-SPEED SENSITIVE RADIAL DRILLS

FOR ALL RAPID, ACCURATE WORK

Write today and find out how you can cut your light drilling and tapping costs from 25 to 50%.

THE HAMMOND MFG. CO., Cleveland, Ohio

Established in 1906



Send for free catalog

SOUTH BEND LATHES

13 inch Lathe	$256.00
15 inch Lathe	336.00
16 inch Lathe	432.00
18 inch Lathe	519.00
21 inch Lathe	771.00
24 inch Lathe	1085.00

SOUTH BEND LATHE WORKS
420 E. Madison St. South Bend, Ind.

The Reynolds Machine Company

Reynolds Screw Driving Machines
For Wood or Machine Screws
Power Driven AUTOMATIC Magazine Feed
MASSILLON, OHIO, U. S. A.

See our Advertisement in June 6th issue.

International Machine Tool Co.

THE LIBBY TURRET LATHE

See our page advertisement in the first issue of each month

INTERNATIONAL MACHINE TOOL CO.
INDIANAPOLIS INDIANA

R-S

Tapping Machines and Automatic Die Heads

We manufacture a complete line of high grade Tapping Machines and Automatic Adjustable Die Heads. Built to R-S standards.
Write for bulletins number 5 and 6.

RICKERT-SHAFER CO. ERIE, PA.

Worcester Lathe Co.

68 Prescott Street
WORCESTER MASS.

MANUFACTURE
11", 13" and 16" LATHES
Both Cone Driven and Geared Head
Our circulars will tell you the story—FOR THE ASKING

REED-PRENTICE COMPANY

R-P

WORCESTER MASS., U. S. A.
METAL TURNING, DRILLING AND SURFACE GRINDING MACHINERY

See our Display ad in the first Issue of each Month

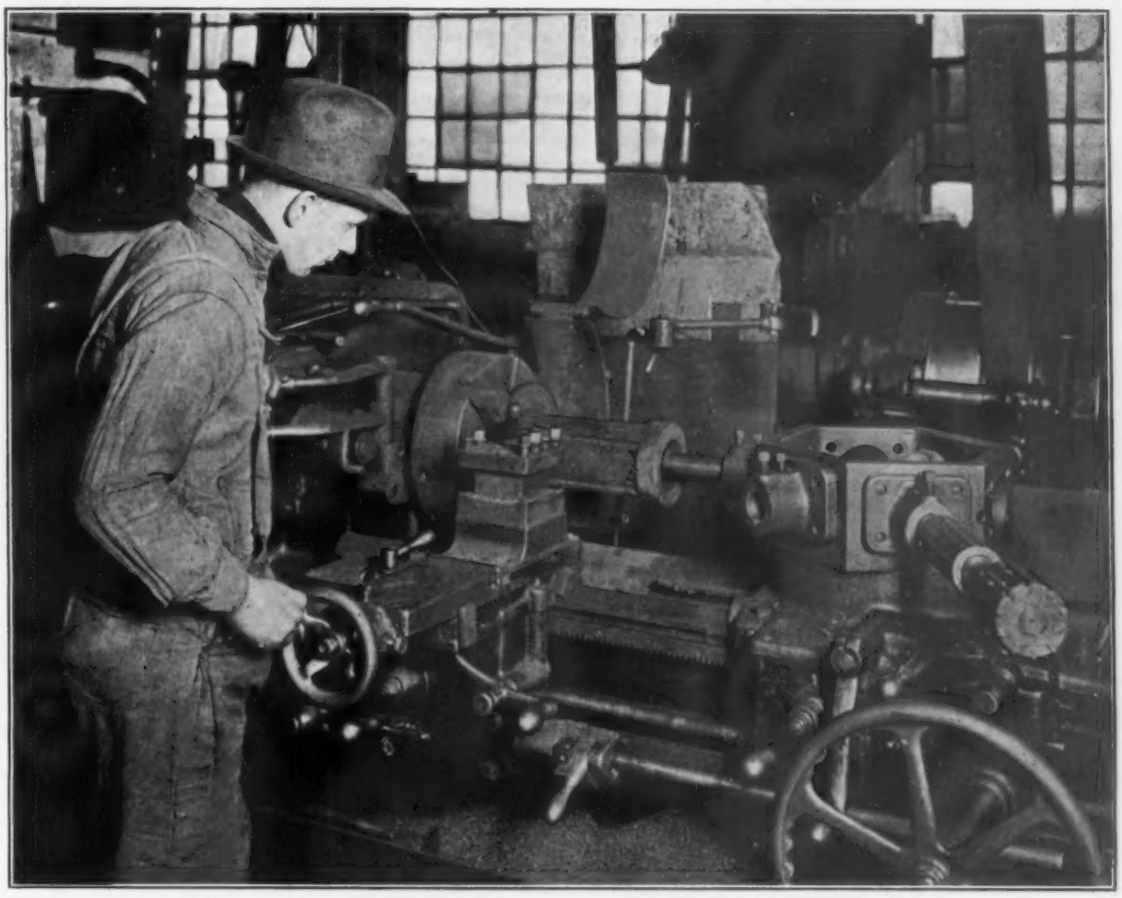
LATHES and PLANERS

SEND FOR CATALOGUE

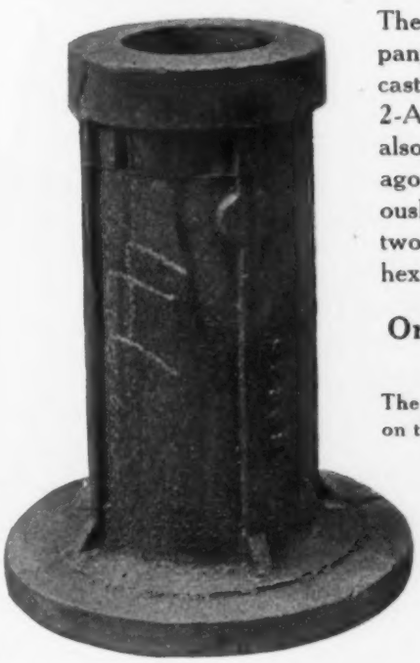
Whitcomb-Blaisdell Machine Tool Co.
WORCESTER, MASS.

THE AMERICAN TOOL WORKS CO.

LATHES, PLANERS, SHAPERS, RADIALS. CINCINNATI, U.S.A.



No. 2-A Universal Hollow-Hexagon Turret Lathe



The Osborn Manufacturing Company, Cleveland, is machining this cast iron jolt cylinder on a No. 2-A to great advantage. Here also you have the square and hexagon turrets working simultaneously—the square turret doing the two facing operations while the hexagon bores and reams.

On Turret Lathe Work of All Kinds

The machine is giving satisfaction here on their wide variety of bar and chucking work.

You should standardize with W & S machines both for profit and complete satisfaction.



THE WARNER & SWASEY COMPANY

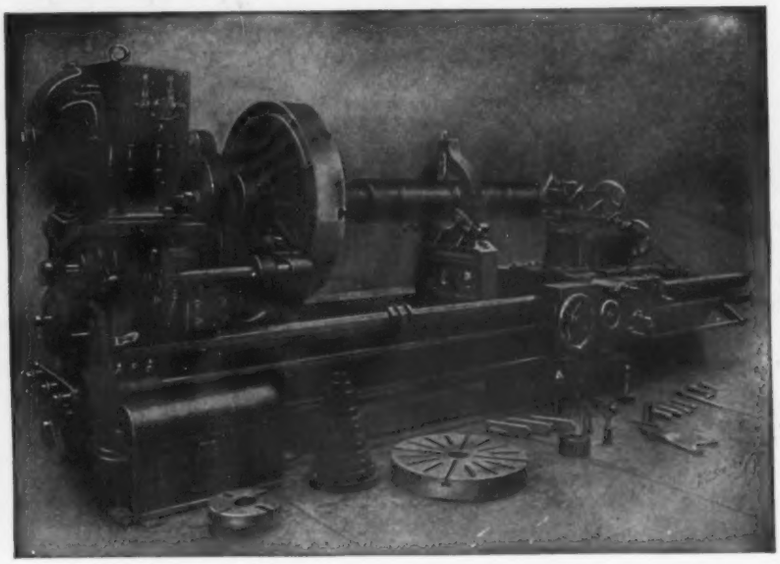
CLEVELAND, OHIO, U. S. A.

NEW YORK OFFICE—Singer Bldg. **Boston Office**—Oliver Bldg. **Buffalo Office**—Iroquois Building
Detroit Office—Ford Building. **Chicago Office and Show Rooms**—618-622 Washington Blvd.

FOREIGN AGENTS: Chas. Churchill & Co., Ltd., London, Birmingham, Manchester, Newcastle-on-Tyne and Glasgow. Allied Machinery Company, Paris and Turin. Van Rietschoten & Houwens, Rotterdam. Yamatake & Co., Tokio. Benson Brothers, Sydney and Melbourne. A. Asher Smith, Sydney. A. R. Williams Machinery Co., Ltd., Toronto, St. John, Winnipeg and Vancouver. Williams & Wilson, Ltd., Montreal.

It is the only Lathe you can buy—

that will take in ALL of your work



Turning Gun on 48-in. Swing of McCabe's "2-in-1" Lathe, 26 and 48-in. Swing

And McCabe's "2-in-1" **DOUBLE-SPINDLE LATHE** is the only Lathe built to work all the time—whether you have large or small work.

It does what the big brute of a Lathe—48-in. Swing does.

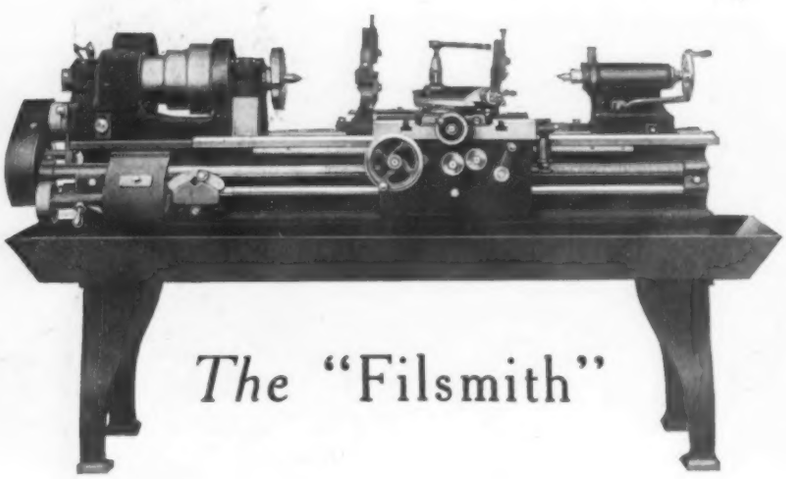
It handles with every convenience what a handy all around 26-in. Lathe does.

Range and power—both—in McCabe's "both size" Lathe.

Interchangeability of parts overcomes high cost of production.

Good Deliveries—any length bed.

J. J. McCabe Lathe and Mach'y Corp.
149 Broadway, New York



The "Filsmith"

High Power Lathe

The Philip Smith Mfg. Company
Sidney, Ohio, U. S. A.

Above the Average

The FILSMITH is above the average for a lathe of its class in design and power.

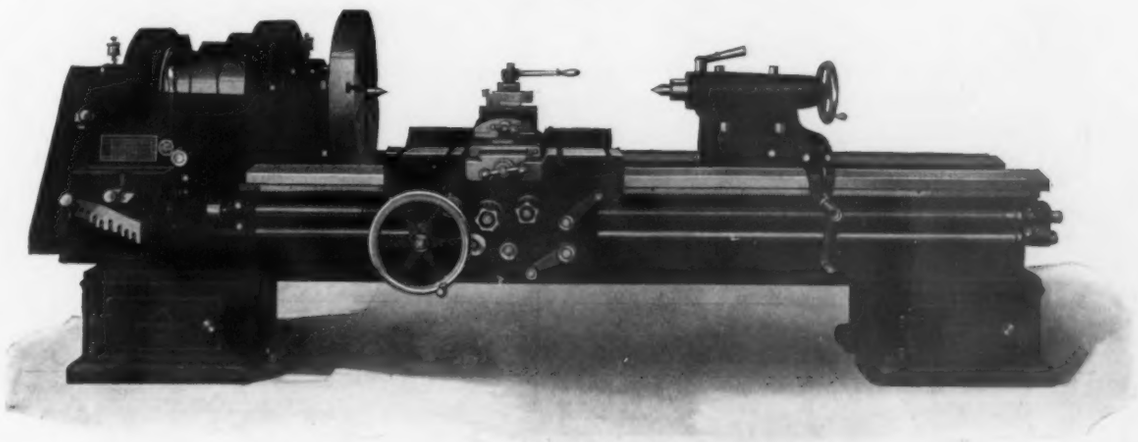
When it comes to comparison a glance through its specifications readily proves it **"all that a lathe should be."**

Large spindle, heavy bed, headstock and tailstock.

The apron — the feed change mechanism — the easy method of control—all contain features that are distinctly FILSMITH.

Full details on request.

Monarch Machine Tool Company Sidney, Ohio.



MONARCH

24", 26", 28" and 30" Lathes

Illustration above shows 24" x 12' lathe with quick change gears and double back gears.

Swing over shears	24¼"
Hole through spindle	2⅛"
Front spindle bearing	4⅝ x 7 3/16"
Back spindle bearing	3 x 4⅞"
Diameter pulleys	11-14-17"
Width belt	4½"
Width carriage bridge	10½"
Length carriage bearing on bed	34"
Diameter Tail Spindle	3⅜"
Countershaft equipped complete with Hyatt Roller bearings, size pulleys	18" x 6"
Weight	8500 lbs.

Consult the Monarch Dealer nearest you regarding delivery and prices. Catalog on request.

Monarch Lathes are built 10, 12, 14, 16, 18, 20, 24, 26, 28 and 30" swing.

The Monarch Machine Tool Co., Sidney, Ohio

DOMESTIC AGENTS:—Lynd-Farquhar Co., Boston, Mass. Brownell Machinery Co., Providence, R. I. Purinton & Smith Co., Hartford, Conn. Kemp Machinery Co., Baltimore, Md. Vandyck Churchill Co., New York City, N. Y. Morris Machinery Co., Newark, N. J. Syracuse Supply Co., Buffalo, Rochester and Albany, N. Y. Monarch Machinery Co., Philadelphia, Pa. J. S. Miller Machinery Co., Pittsburgh, Pa. W. M. Pattison Supply Co., Cleveland, O. Coughlin Machinery & Supply Co., Toledo, O. Patterson Tool & Supply Co., Dayton, O. Osborne & Sexton Machinery Co., Columbus, O. Vonnegut Machinery Co., Indianapolis, Ind. Greensboro Supply Co., Greensboro, N. C. Oliver H. Van Horn Co., New Orleans, La. Charles A. Strelinger Co., Detroit, Mich. McMullen Machinery Co., Grand Rapids, Mich. Federal Machinery Sales Co., Chicago, Ill. Badger Packard Machinery Co., Milwaukee, Wis. Northern Machinery Co., Minneapolis, Minn. Colcord Wright Machinery & Supply Co., St. Louis, Mo. English Tool & Supply Co., Kansas City, Mo. Sunderland Machinery & Supply Co., Omaha, Neb. Hendrie & Bolthoff Mfg. & Supply Co., Denver, Colo. Salt Lake Hdwe. Co., Salt Lake City, Utah. General Machinery Co., Spokane. Hallidie Machinery Co., Seattle. Eccles & Smith Co., Portland, San Francisco and Los Angeles.



A G-K Lathe Is Fool-Proof

A vast majority of America's skilled mechanics have entered the service of Uncle Sam. Manufacturers are forced to rely upon unskilled help to run the various machines in their shops.

The designers of G-K LATHES, recognizing the importance of producing machinery which is fool-proof and simple to operate, have given a great deal of thought to this phase of construction in G-K LATHES.

The result is—G-K LATHES are the most fool-proof, easily controlled and will stand more abuse than any other lathe of the present day.

Get a copy of our catalog—G-K Betterments.

The Greaves-Klusman Tool Company

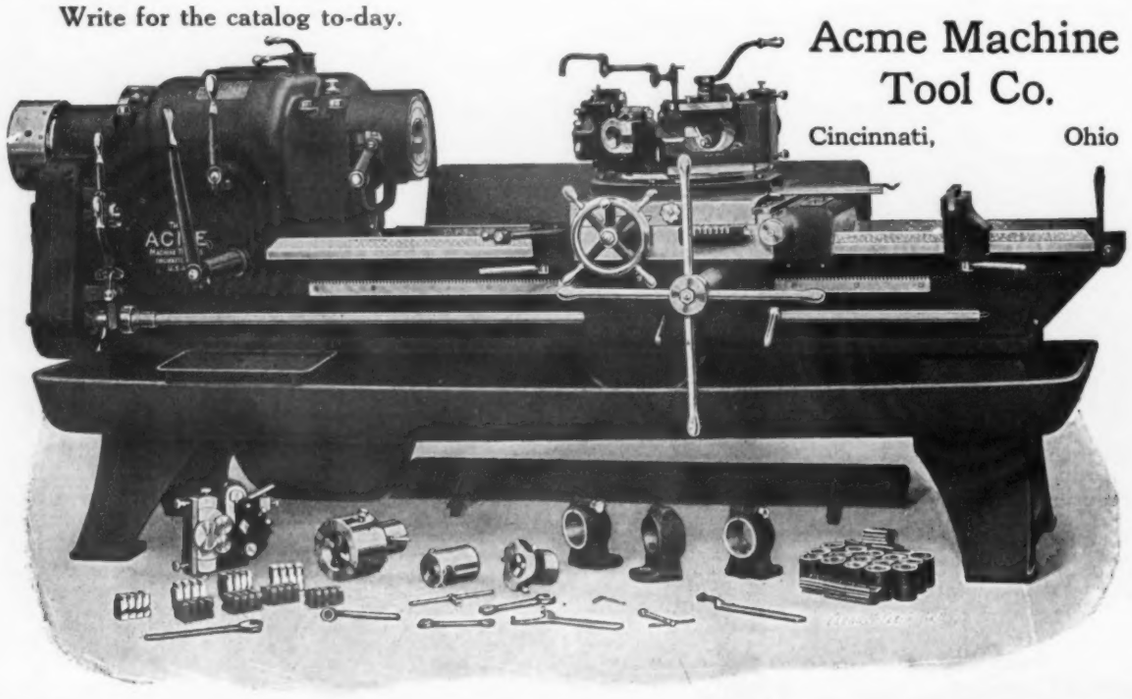
Cincinnati, Ohio, U. S. A.

Carefully Designed, Carefully Built

to meet the requirements of every turret lathe user. It can handle a wide range of bar and chucking work with exceptional ability. In fact it will take bar work up to 3¼" diameter and chucking work up to 16" diameter. The actual swing over the bed is 22".

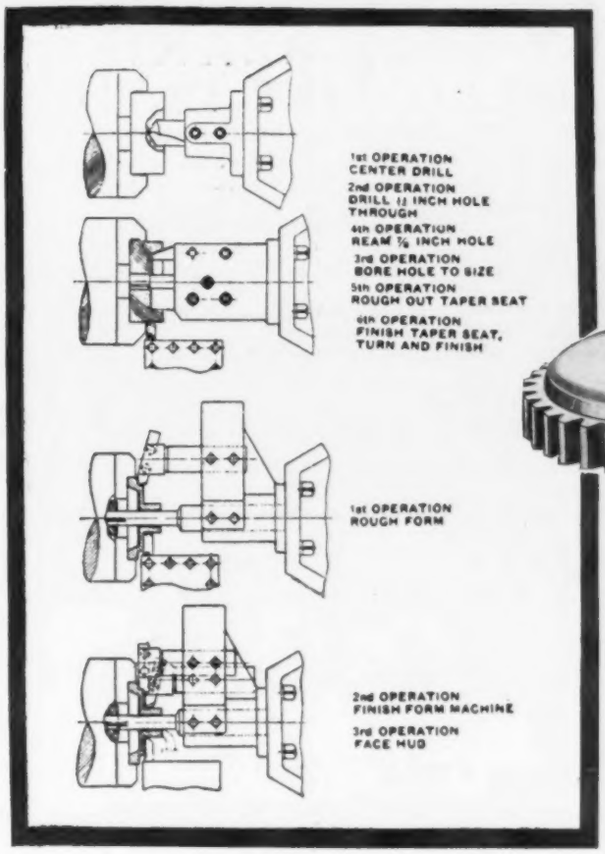
Each lathe is equipped with our patent gear shifting device which enables you to obtain any speed desired instantly.

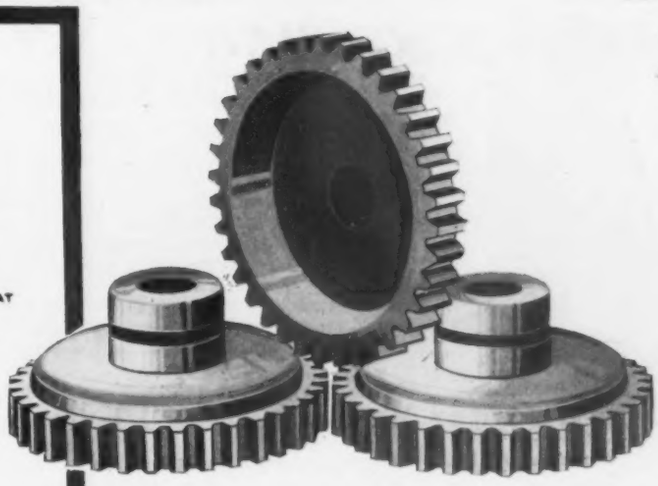
Write for the catalog to-day.



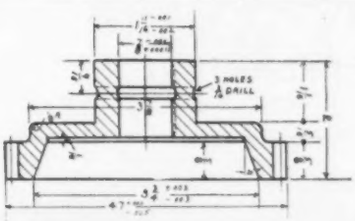
Acme Machine Tool Co.

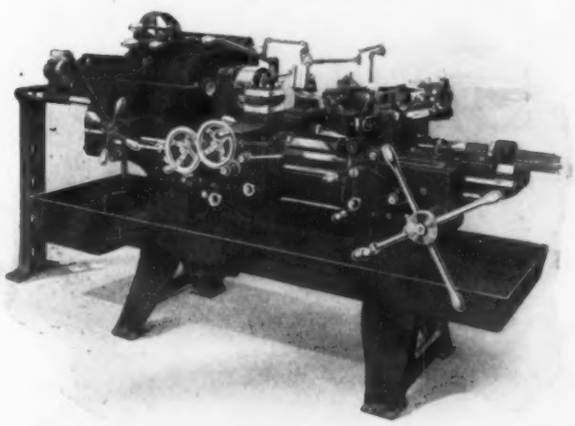
Cincinnati, Ohio





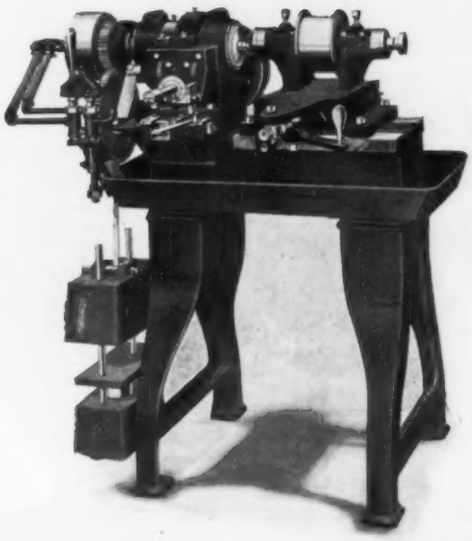
Business Like In Appearance





It is, indeed, and just as business like as it looks when there is work to be done; whether it is cutting costs on a long production job or hustling through repair parts. And it has the backbone to get the work through without delay. In fact, to do the business in the best, quickest and cheapest way, the design of the Foster 1-B Universal Turret Lathe has been worked up to eliminate all waste—waste in effort or time.

Study the tool lay-out. It will give you an idea what the 1-B Universal Turret Lathe is capable of doing on friction gear blanks and will also show the advantage of two tool carrying units working simultaneously.



The H&M Thread Millers are the most rapid and the most accurate methods of cutting threads known to engineers to-day. They have been universally adopted by all the leading manufacturers of ammunition in this country and abroad. Manufactured under the Holden-Morgan patents.

THE FOSTER LINE

No. 1-B UNIVERSAL TURRET LATHE
Bar Cap. 2" Swing over Carriage, 14" over Cross Slide, 8"

No. 2-B UNIVERSAL TURRET LATHE
Bar Cap. 3¼" Swing over Carriage, 20 ..." over Cross Slide, 13½"

No. 0 PLAIN HEAD SCREW MACHINE
Bar Cap. ⅞" 10" Swing

No. 1 PLAIN HEAD SCREW MACHINE
Bar Cap. 1⅛" 11" Swing

No. 2 PLAIN AND FRICTION HEAD SCREW MACHINES
Bar Cap. 1⅜" 13" Swing

No. 3 PLAIN, FRICTION AND ALL GEARED HEAD SCREW MACHINES
Bar Cap. 1⅝" 14" Swing

No. 4 FRICTION HEAD SCREW MACHINE
Bar Cap. 1⅞" 17¼" Swing

No. 5 ALL GEARED HEAD SCREW MACHINE
Bar Cap. 1⅛" 17¼" Swing

Nos. 6, 7, 8, 9, 10 FRICTION HEAD SCREW MACHINES
Bar Cap. 2⅛"; 2⅜"; 2⅝"; 2⅞"; 3⅛", respectively 20" Swing

No. 2 FRICTION HEAD UNIVERSAL TURRET LATHE
Bar Cap. 1⅜" 14" Swing

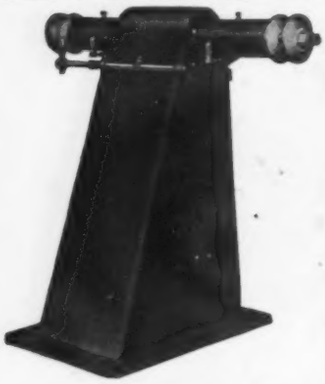
No. 2 FRICTION SET-OVER TURRET LATHE
Bar Cap. 1⅜" 14" Swing

No. 3 FRICTION HEAD UNIVERSAL TURRET LATHE
Bar Cap. 1⅝" 16" Swing

No. 3 FRICTION HEAD SET-OVER TURRET LATHE
Bar Cap. 1⅝" 16" Swing

Thread Millers manufactured under the Holden-Morgan patents

Foster Machine Company
Elkhart, Indiana, U. S. A.



No. 6 HEAVY BALL BEARING POLISHING and BUFFING LATHE

FRICTION CONSUMES POWER AND POWER COSTS MONEY

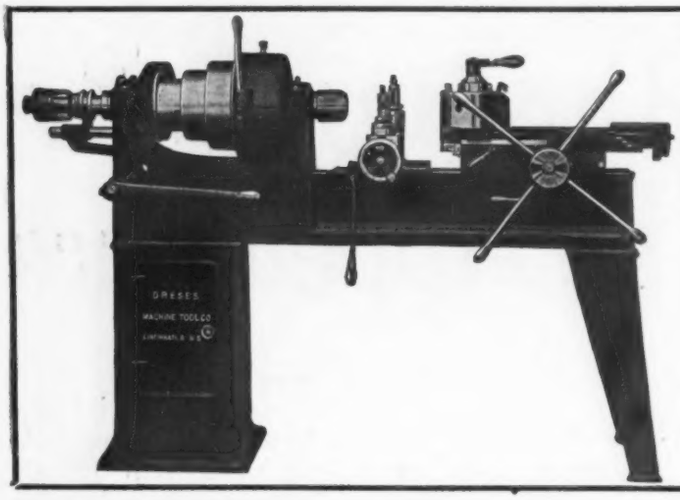
It is a well known fact that ordinary polishing lathes consume excessive power, due largely to the friction caused by the style of bearings employed, to eliminate which we have recently designed several sizes of Ball Bearing machines.

Illustration shows our Heavy No. 6 Machine fitted with (4) Ball Bearings, has tight and loose pulleys on spindle for 6" width of belt, may be either belted from above or below, and in the latter case pulley covers are provided as shown, preventing belts carrying dust and lint.

Machine weighs 650 pounds, and we believe is the most rigid, substantial, best built and longest lived polishing lathe made today by any manufacturer.

If you are interested in reducing your polishing room power costs write and ask us for Bulletin No. 23.

The Webster & Perks Tool Co., Box 1240, Springfield, Ohio, U. S. A.

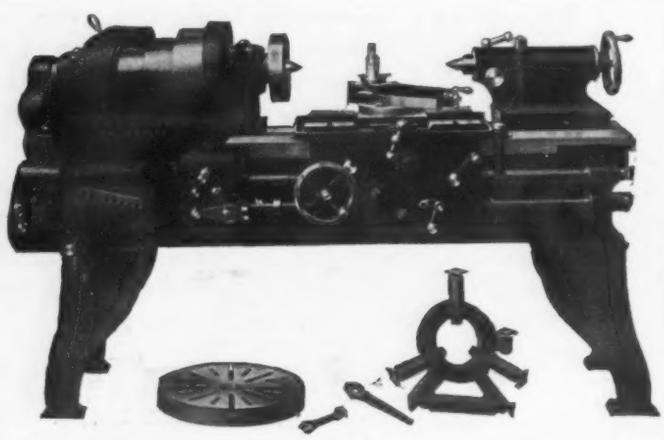


Turret Lathes and Screw Machines

All sizes and styles.

Most modern, redesigned and improved.

Dreses Machine Tool Co.
CINCINNATI, OHIO



16" LEHMANN LATHE SWINGS 18¼"

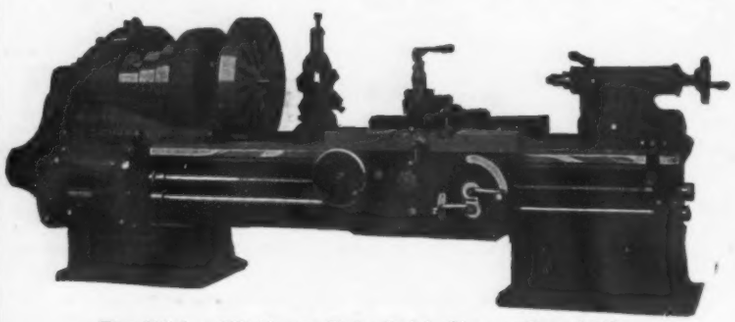
We Also Make
18" Lehmann Lathe—Swings 20¼"

Built for Heavy Duty and Accuracy

3-STEP CONE for 3" belt, DOUBLE BACK GEARS, CHILLED BED, HIGH CARBON STEEL SPINDLE, PHOSPHOR BRONZE BEARINGS, DOUBLE PLATE APRON, STEEL GEARING, BALL THRUST BEARING for lead screw, cuts threads 2 to 112 to the inch without change of gears, GEARED FEEDS from .007 to .4, 9' bed takes 5' between centers, net weight 3020 lbs. on 16" lathe. *Write for circular illustrating NEW and INTERESTING FEATURES of these lathes.*

LEHMANN MACHINE CO.
606 to 612 So. Broadway ST. LOUIS, MO.

Wickes Heavy Duty Engine Lathe



The Wickes 26" Heavy Duty Quick Change Gear Lathe

Built in lengths from 8 ft. up. Has 3-step cone, is double back geared and has double plate apron.

This tool is built for the most severe service; all parts liberal in size; has special ball thrust bearings; steel apron gears; coarse pitch and wide face gears, which are all well guarded. Let us tell you about this lathe and also our 18", 32" and 36" machine.

We can make prompt shipments.

WICKES BROTHERS
SAGINAW - - MICH.

AGENTS—Wickes Bros., Seattle, Wash. Rolph Mills & Co., San Francisco, Cal. Rolph Mills & Co., Los Angeles, Cal. Machine Tool Sales Co., Pittsburg, Pa. Badger Packard Mchy. Co., Milwaukee, Wis.

Have You Reserved Space

in

The Machinery Sales Department

of the

GRAND CENTRAL PALACE

or written for information as to how this exhibit can be made useful to your sales department?

An Opportunity

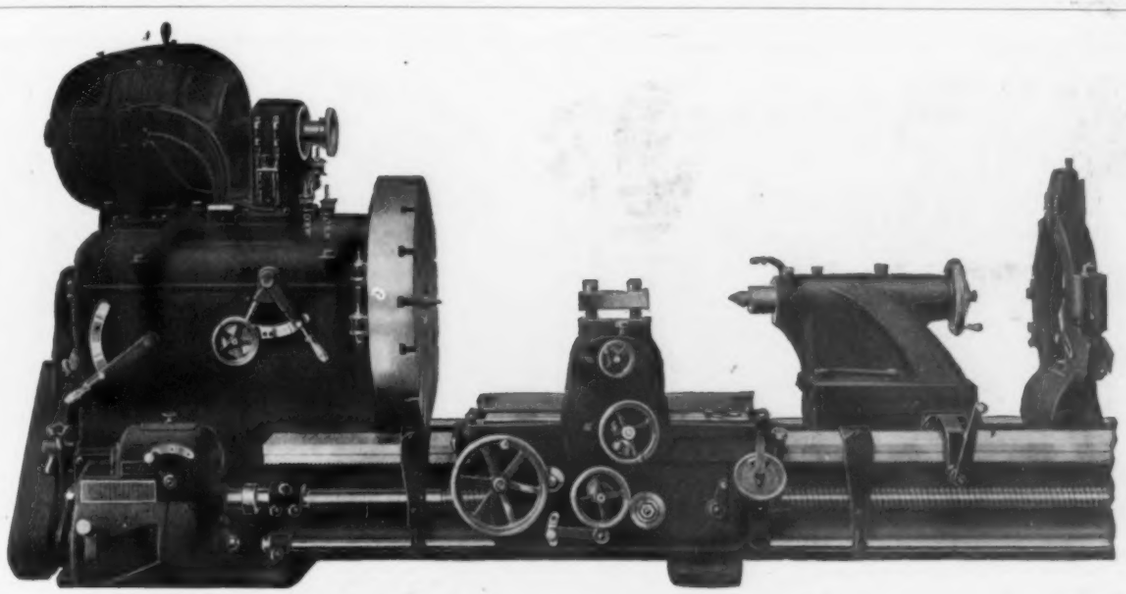
for the permanent display and sale of all classes of machinery and mechanical equipment—in actual operation if desired.

Everything will be done to attract the buyer.

Why not avail yourself of this opportunity to open a permanent salesroom in the buying center of the world, where your products will be seen and purchased? Full information as to space, rates, floor plans, etc., cheerfully furnished.

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Grand Central Palace New York City



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42" Heavy Lathe with Variable Speed 3: 1 D. C. Motor with All Steel Gearing

LARGE LATHES

32, 36, 42, 48, 54 AND 60-IN. SIZES

THE HOUSTON, STANWOOD & GAMBLE COMPANY

CINCINNATI, U. S. A.

Speeding Up the Production Of Shells

Walcott Lathes, in big munition plants are proving themselves extremely valuable by helping to maintain the steady stream of shells required by Uncle Sam.

If you need lathes for shell turning, it will pay you to investigate the Walcott—the lathe that has been the standard for 37 years.

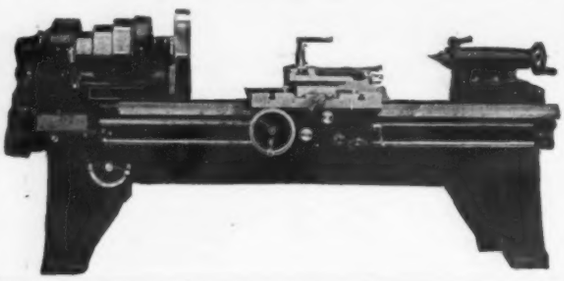
Made in 14, 16, 18, 20, 26 and 29 inch sizes. Prompt delivery, any size—any quantity.

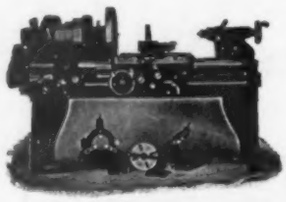
Walcott Lathe Company

414-420 North Jackson Street

Jackson, Mich., U. S. A.

AGENTS—Hill, Clarke & Co., Chicago, Ill. Fenwick Freres & Co., Paris, France. Frevert Machinery Co., New York City. N. Y. W. E. Shipley Machinery Co., Philadelphia, Pa. Buck & Hickman, Ltd., London, England. National Supply Co., Toledo, Ohio. Motch & Merryweather Mach. Co., Cleveland, Ohio. Motch & Merryweather Mach. Co., Pittsburgh, Pa. Parke & Lacy Co., Sydney, N. S. W. Brown-McDonald Machry. Co., St. Louis, Mo. Smith-Booth-Usher Co., Los Angeles, Cal. P. H. Reardon, San Francisco, Cal. Wm. E. Duff, York, Pa. Wm. E. Duff, Jacksonville, Fla. Standard Mch. & Supplies, Ltd., Montreal. H. W. Petrie, Toronto.





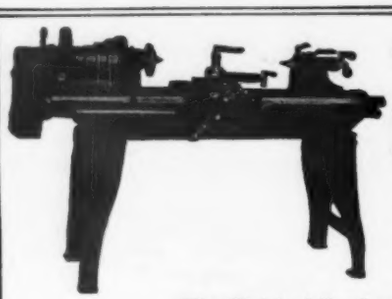
A Lathe For The Modern Shop

The "Economy" 18 inch, Double Back Geared, Quick Change Lathe is of the most improved design—with special features adapting it to a wide range of work.

Before adding that new lathe equipment get full details of the "Economy" Lathe. Catalog?

Rockford Lathe & Drill Co.

Rockford, Illinois U. S. A.



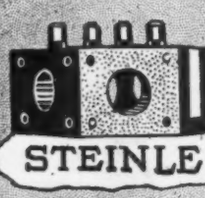
"STAR" LATHES

9-11-13 SWING and all NECESSARY ATTACHMENTS

The Finished Product of
30 YEARS' LATHE EXPERIENCE
Accurate, Durable, Economical
Send for Catalog B

SENECA FALLS MFG. CO.

355 FALL ST. SENECA FALLS, N. Y.



Steinle Turret Lathe

When you want a turret lathe that is strong, that will produce at a high rate of speed, and that will fulfill all of your manufacturing requirements, get a Steinle Full Swing Side Carriage Turret Lathe. Catalog will be mailed you on request.

Steinle Turret Machine Co.
Madison, Wis., U. S. A.



FULTON Heavy Duty Lathe

The FULTON Lathe is adaptable for plain boring, turning and facing. It can be furnished with friction head for spindle control, plain rests, compound rest, tapering attachment and steel oil pan as the occasion requires. Catalog?

Fulton Machine Tool Co.

1436 Bryan Place CHICAGO, ILL.

ROLL LATHES

The Hyde Park kind are manufactured from correctly made castings, of heavy and rigid construction and built to last many years.

ROLLS
Sand and Chilled

Handled by an experienced mill man. Tell us when you expect to place your next order.

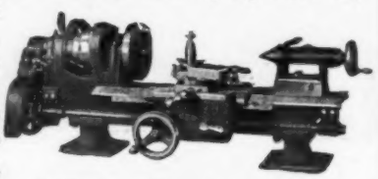
ROLL LATHES IRON CASTINGS
TIN PLATE MACHINERY

Hyde Park Foundry & Machine Co.

HYDE PARK (West Penn. Div. P. R. R.) PA.

DOING OUR BIT with the "DALTON SIX"

THIS powerful little lathe is working night and day in hundreds of manufacturing plants, making the same pieces you are now turning on those large lathes you should be using for other jobs, that you may do your "BIT" in full measure.



Send for Bulletin B-611

Dalton Manufacturing Corporation

1915 PARK AVENUE, NEW YORK, U. S. A.

Cable Address "ALEDAL New York"

Putnam Latest Pattern 79″, 85″, 90″ Driving Wheel Lathes

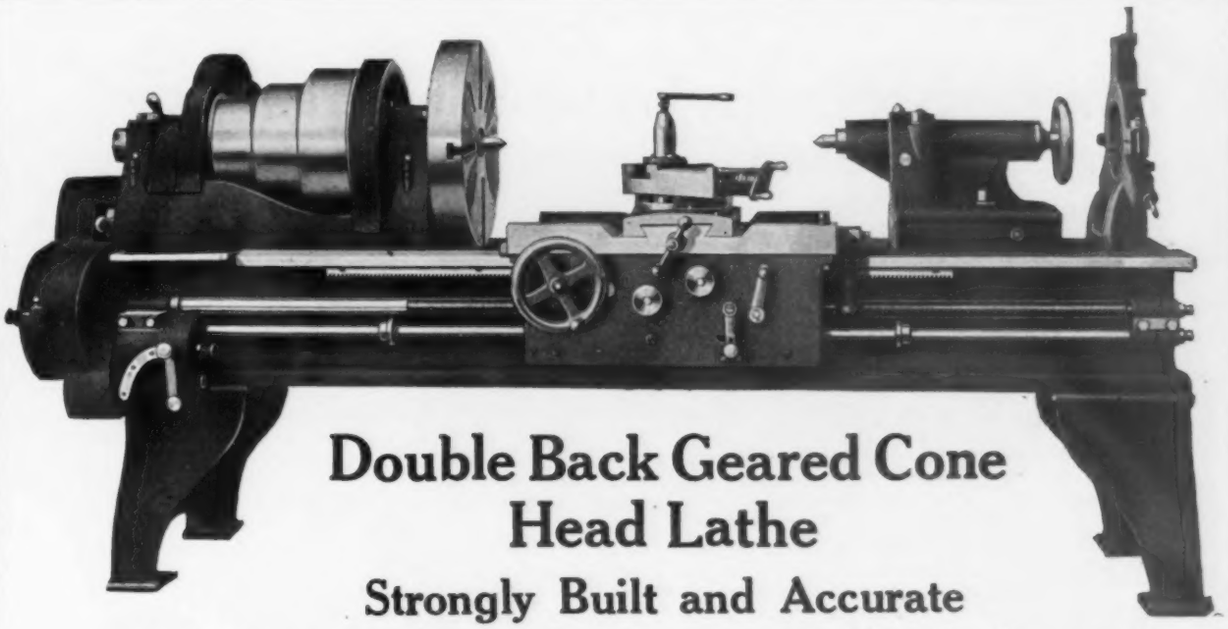
All Steel Gearing.
The most powerful lathes built.
Can be furnished belt and motor driven, as desired.



MANNING, MAXWELL & MOORE, INC. **119 West 40th Street, New York**

MACHINE SHOP AND FOUNDRY EQUIPMENT OF EVERY DESCRIPTION

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Double Back Geared Cone Head Lathe

Strongly Built and Accurate

Here is a good substantial lathe capable of taking advantage of the full cutting power of high speed steel on the heaviest work.

Crucible steel spindle, self-oiling bronze boxes, quick change feed box and other attachments conform to the latest high-grade lathe practice.

Rapid Production HAMILTON Machine Tools

The Hamilton Machine Tool Co.
969 Symmes Avenue
HAMILTON, OHIO

Bulletin on Request

RADICAL
FITCHBURG AUTOMATIC MACHINE WORKS

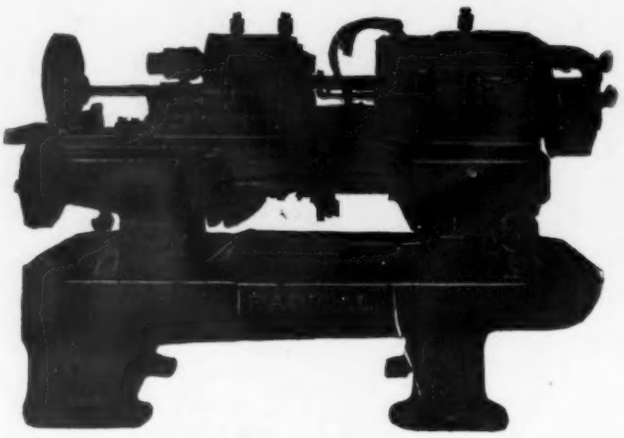
FITCHBURG, MASS.

A BATTERY OF RADICALS ANNIHILATES A WHOLE REGIMENT

of

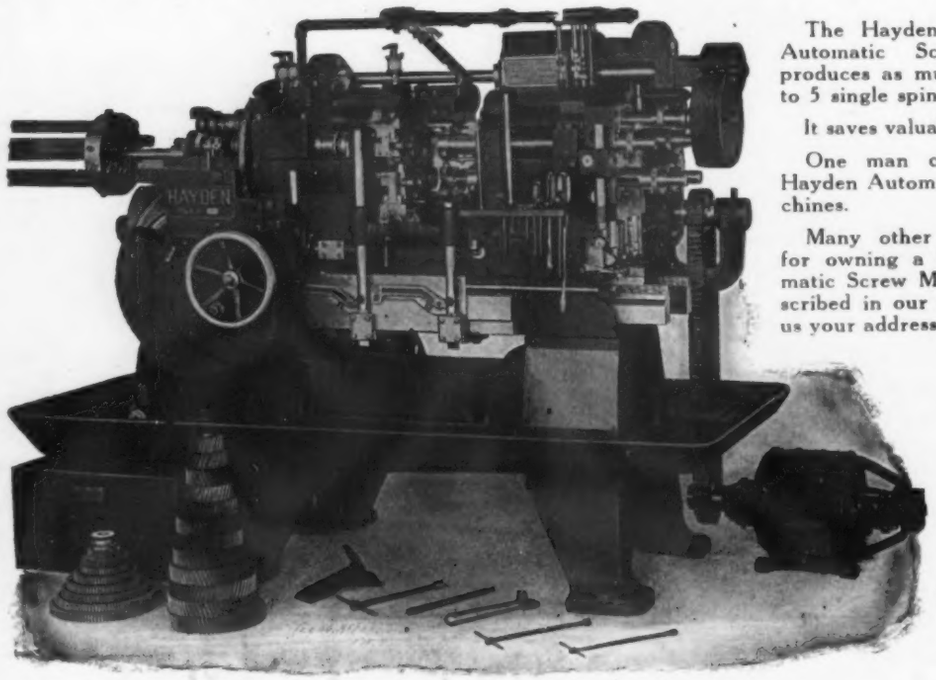
Down Hours—

"Over There"
or Anywhere Else



THE RADICAL AUTOMATIC—Fitchburg, Mass.

Advantages of the Hayden Automatic Screw Machine

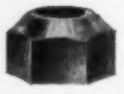


The Hayden Five Spindle Automatic Screw Machine produces as much work as 3 to 5 single spindle machines.

It saves valuable floor space.

One man can operate 3 Hayden Automatic Screw Machines.

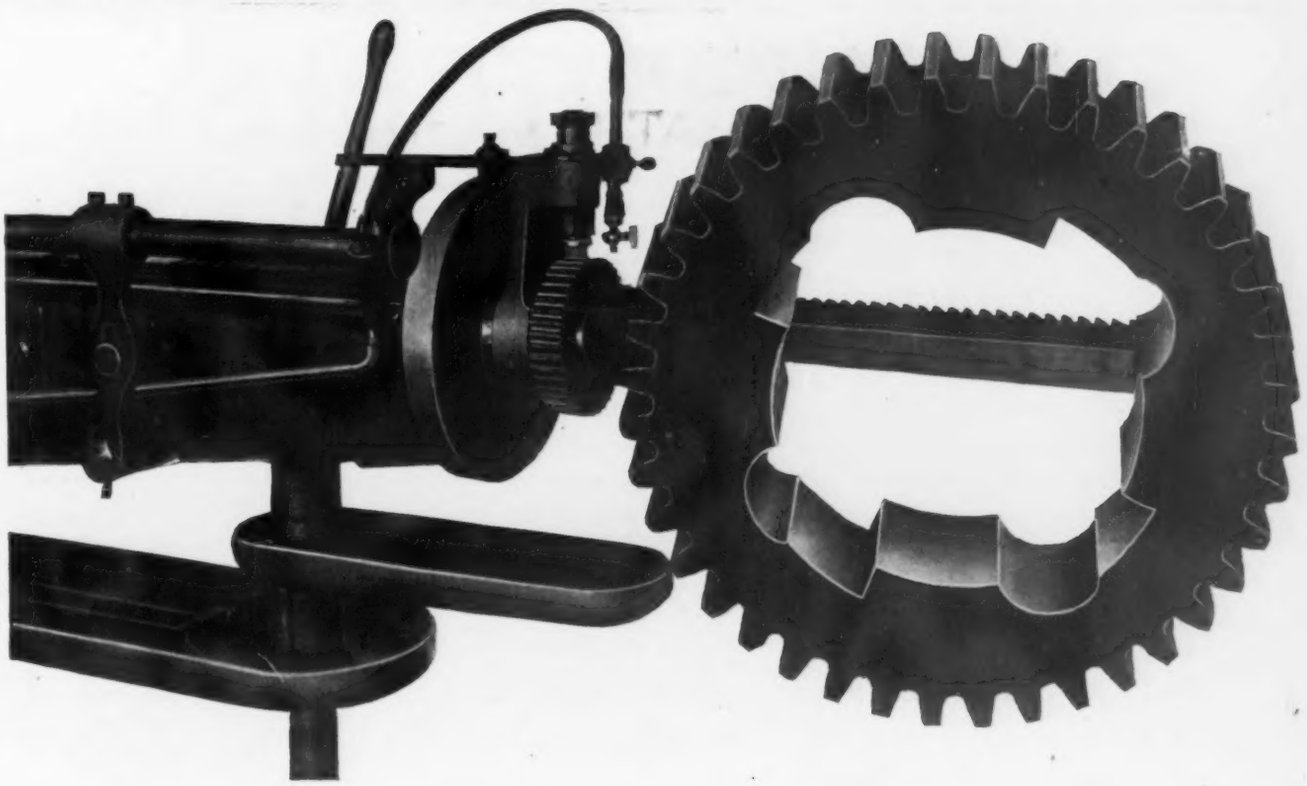
Many other good reasons for owning a Hayden Automatic Screw Machine are described in our catalog. Send us your address for a copy.



500 per Hour

CINCINNATI AUTOMATIC MACHINE CO.

OAKLEY, CINCINNATI, OHIO, U. S. A.



These 4 Cam Grooves Can Be Broached Singly or All At Once

The work is done accurately and with great speed.

Broaching is the master method for increasing production. Lower cost per piece and more pieces per hour are the two conspicuous advantages of broaching.

J. N. Lapointe Co. Broaching Machines are made in all sizes and styles and for all classes of work. They are in world-wide use—in every line of industry.

Why not consult with us about your work and see if you can't use broaching to advantage? No obligations incurred. Free Information on request.

THE J. N. LAPOINTE COMPANY

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MACHINE TOOLS

We are by far the largest manufacturers of machine tools in the world, and are in a particularly favorable position to furnish complete machine tool equipment for a general machine shop, railroad shop, shipyard or arsenal.

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NILES-BEMENT-POND CO.

GENERAL OFFICES: 111 BROADWAY, NEW YORK

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May We Do As Much For You?

4 Pitch Cast Iron Worm, 1½" Outside Diameter Single Thread, 1 3/16" Face
CUTTING TIME 1½ MINUTES
DO YOU EQUAL IT?

Let us estimate similar production on the

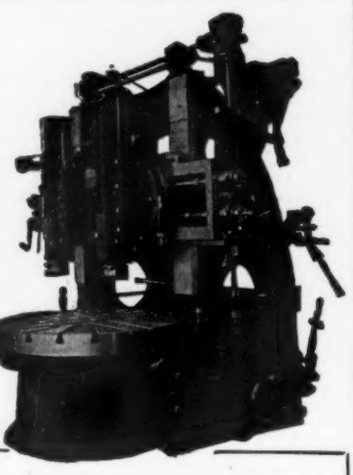
Automatic Threading Lathe

Automatic Machine Company BRIDGEPORT CONN.

OVER-SEAS REPRESENTATIVE

ALMACOA ALLIED MACHINERY COMPANY OF AMERICA ALMACOA
120 BROADWAY, NEW YORK, U.S.A.

Paris Turin Zurich Barcelona



The Best Boring Mill For Your Plant

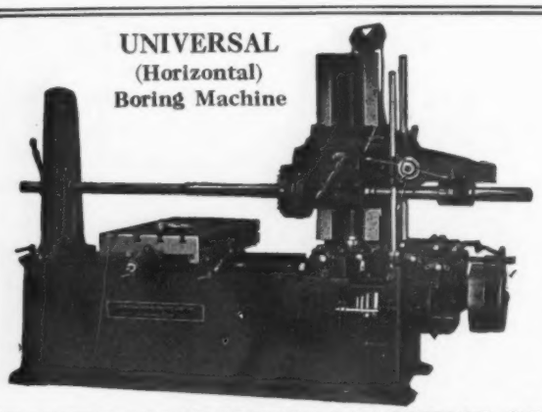
is what you're looking for. A machine that will do your boring and turning work efficiently and at lowest operating cost. The Colburn is built from best materials, is massive and powerful and can withstand the hard strain of long service. Every detail is made with the utmost accuracy.

Catalog illustrates and describes our complete line. Send for it now.

Colburn Machine Tool Co.

FRANKLIN, PA., U. S. A.

UNIVERSAL
(Horizontal)
Boring Machine



UNIVERSAL BORING MACHINE CO.

HUDSON, MASS., U. S. A.

PRECISION

HORIZONTAL BORING, DRILLING and MILLING MACHINE

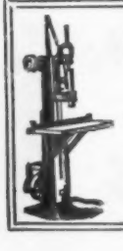
LUCAS MACHINE TOOL COMPANY

CLEVELAND OHIO, U. S. A.

Lucas Patent Power Forcing Press

COMPLETE SHELL MAKING EQUIPMENT

THE AMERICAN EQUIPMENT CO., Bucyrus, O.



FOUND AT LAST!

A boring machine for wood built on a right principle. Workmanship and material the best. New features. Send for circular.

R. E. Kidder Co. 33 Hermon Street Worcester, Mass.

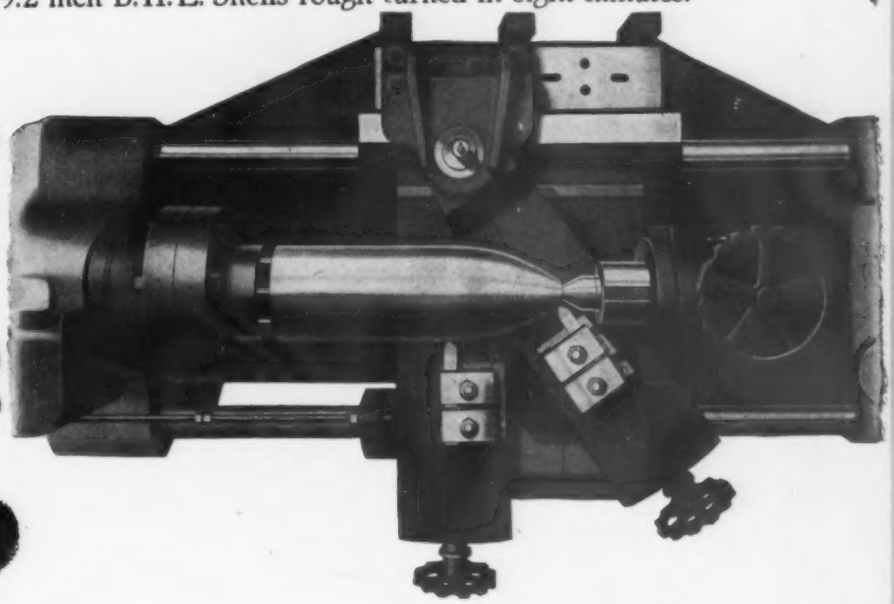
MORTON MANUFACTURING CO.

Draw Cut Shapers,
Special Draw Cut R. R. Shapers,
Special Locomotive Cylinder Planers, Portable Planers, Stationary and Portable Key Way Cutters, Finished Machine Keys

OFFICE & WORKS, MUSKEGON HEIGHTS, U. S. A.

8 minutes

EQUIPMENT
AMALGAMATED DUPLEX CARRIAGE
(DERROM PATENT)
ACCOMPLISHMENT
9.2 inch B. H. E. Shells rough turned in eight minutes.



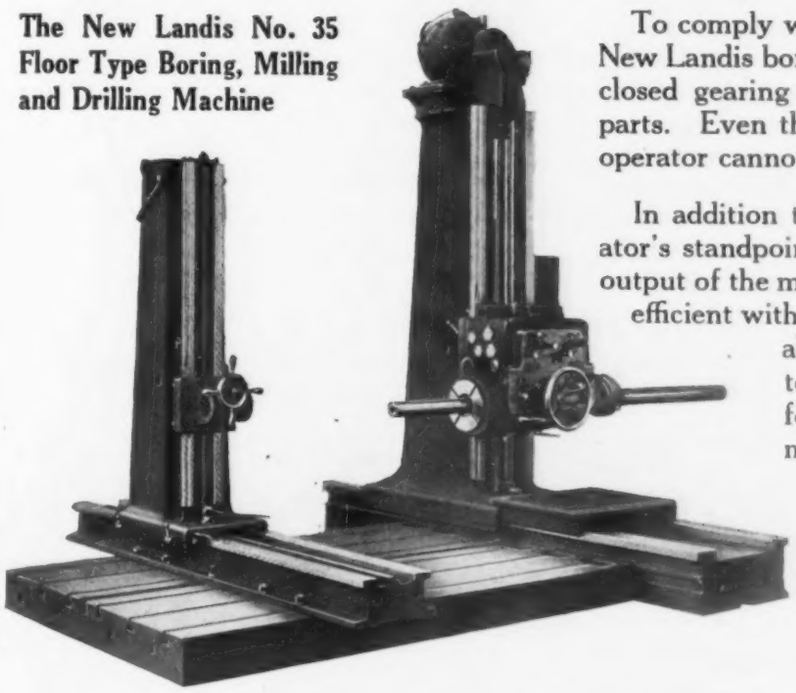
POSSIBILITIES
Unusually quick deliveries.

Catalog and full information on request.

AMALGAMATED
Machinery Corporation
72 West Adams St.
CHICAGO

All Gears and Revolving Parts Enclosed

The New Landis No. 35 Floor Type Boring, Milling and Drilling Machine



To comply with all State factory laws the New Landis boring machine is built with enclosed gearing and well guarded revolving parts. Even the motor is placed where the operator cannot come in contact with it.

In addition to their value from the operator's standpoint these features increase the output of the machine. The operator is more efficient with a machine of this type and is able to give his entire attention to any one of the **seven** different operations of which the machine is capable.

There are some important features about this New Landis Boring Machine which you should investigate. Send for our Boring Machine Catalog.

LANDIS TOOL COMPANY, Waynesboro, Pennsylvania, U. S. A.
New York City, 50 Church Street

One from ten thousand—

The New Bullard 61-inch Maxi-Mill

A new machine, yes—new, yet old!

It is thirty-five years since we built our first Vertical Boring and Turning Mill, and in that time we have built and shipped over ten thousand machines of the vertical type.

The 61-INCH BULLARD MAXI-MILL represents the best of what we have learned and every unit, every feature in its design has been proved good in these trying days of intensive production.

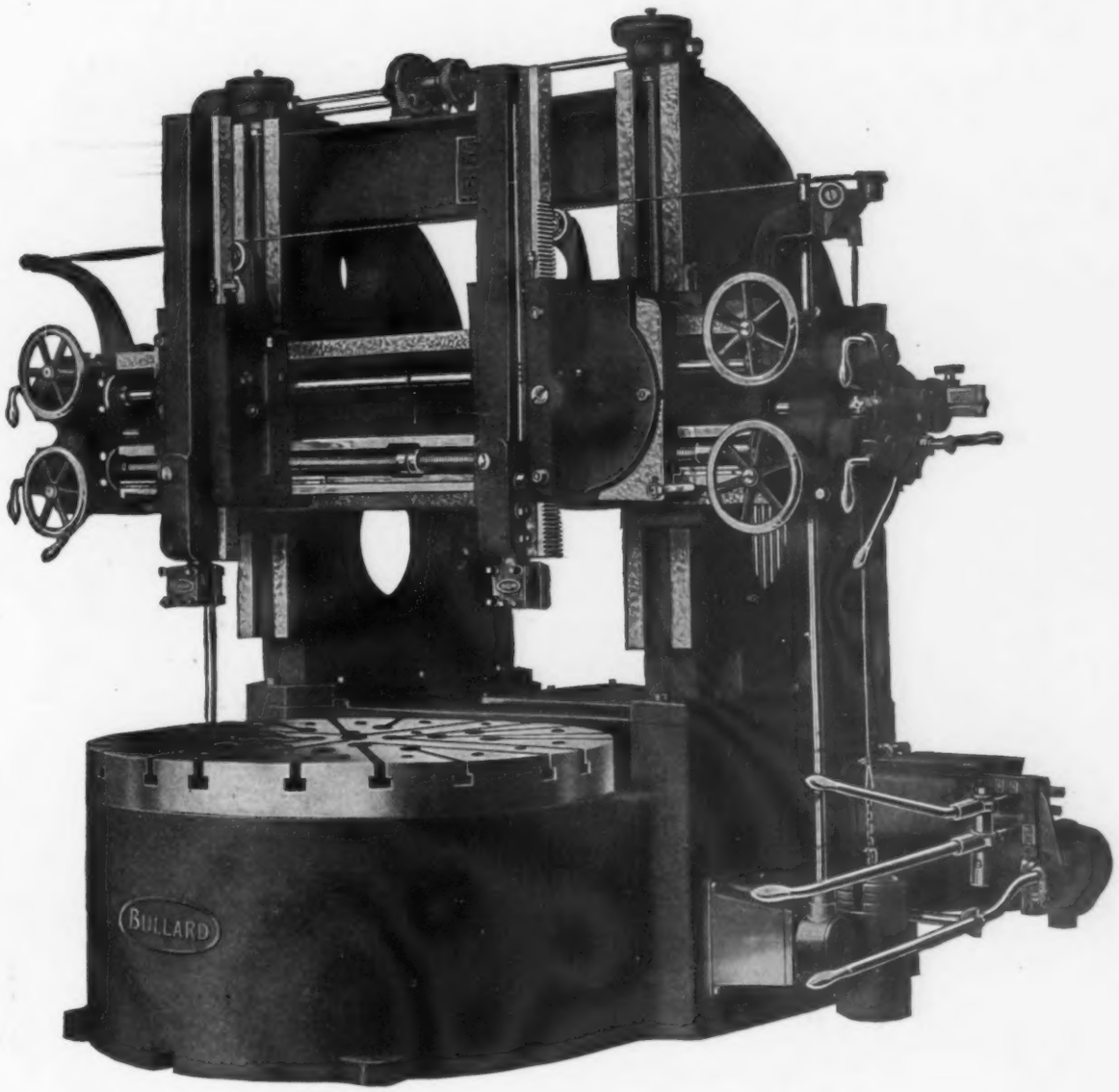
These are some of the exceptional features of this machine:

Chrome nickel gears and shafts—continuous flow lubrication — centralized control — unequaled convenience—accuracy of the highest order—and *a cutting lubricant system that keeps water out of the machine and off the floor.*

These features mark a real advance in Boring and Turning Mill construction. The cutting lubricant system is particularly notable, this being the first machine of its type in which it is possible to use coolant in large and effective volume without the possibility of its entrance into the machine itself.

Our patented "Hammer Hand Wheel" is another step toward speed and accuracy. They very simply enable the operator to obtain the most minute adjustment of head traverses—and eliminate dangerous rotating handles.

BULLARD **The Bullard Machine**



The New Bullard 61-inch Maxi-Mill

Deliveries Are Good

Let us give you the full details on this machine

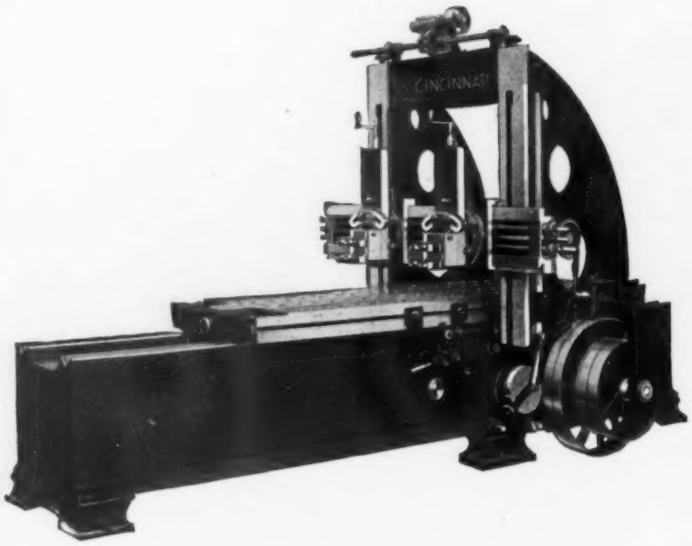
Tool Company, Bridgeport, Conn.

Satisfaction in Planers

The Planer that gives you the most satisfaction is the one that can produce your work quickly, and to exact specifications, give long service and save money on your planing work. Perhaps you think there is no such planer, but we can prove it.

"Cincinnati" Planers have shown their ability in handling all kinds of work efficiently and in giving satisfaction.

Let us send you our catalog called "Planer Operations"; it illustrates and explains the way "Cincinnati" Planers are doing big work, and saving money for many large manufacturing concerns who are using them. Write today.



Cincinnati Planer Co.

Cincinnati, Ohio, U.S.A.

OHIO

ACCURATE, POWERFUL, ECONOMICAL

Ohio Planers are built under the direct supervision of expert mechanics, every machined part is perfectly made and accurately fitted and assembled.

The planer illustrated in this cut is the 42 x 42 inch (Standard Pattern) type and is built for accurately machining the heaviest class of work at the maximum capacity of high speed steel.

Our expert mechanics after thirty years of experience have made it possible for us to offer you this unusual labor saving machine.

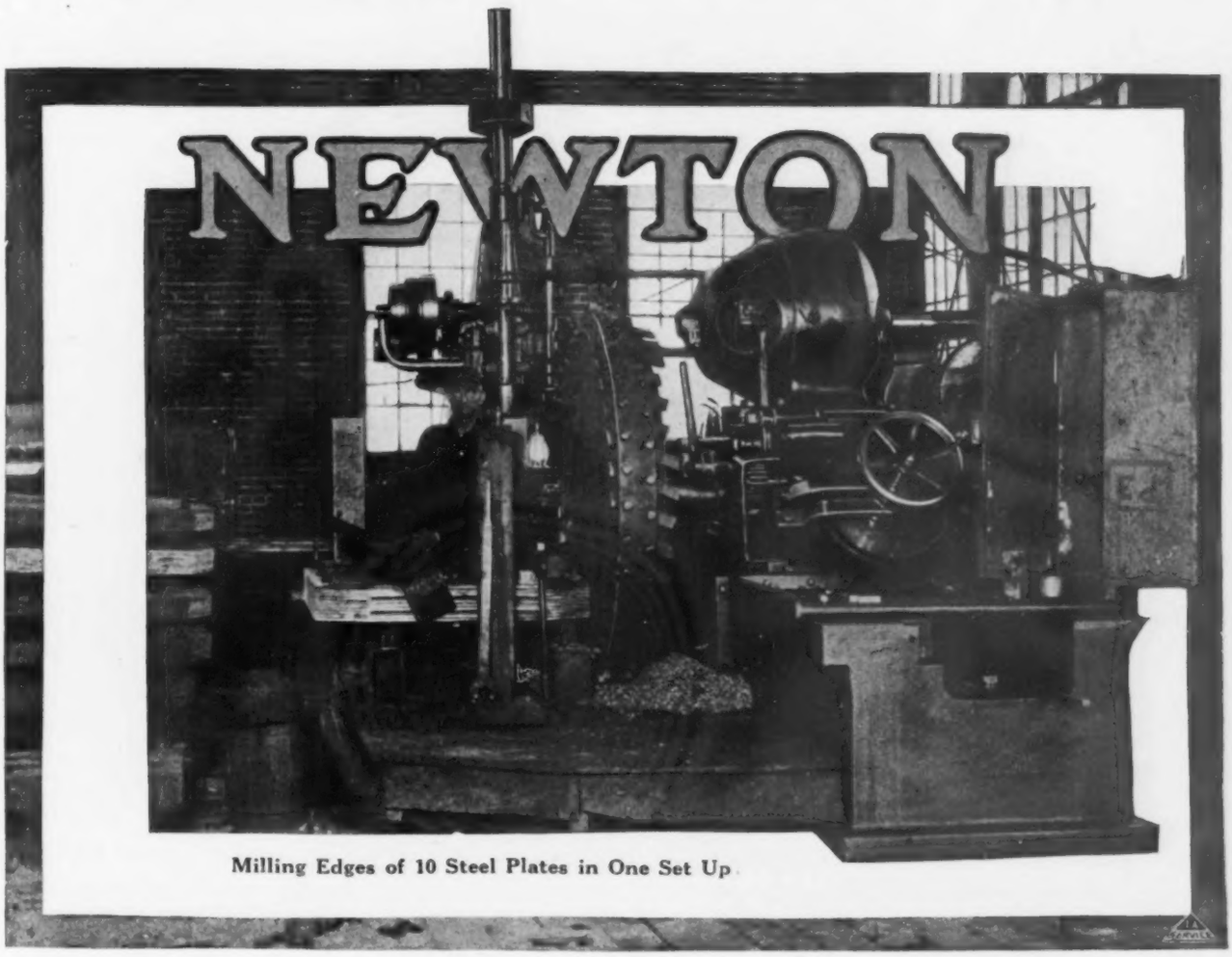
Let us send you our catalog. It contains many interesting features on planing. Write for it now.



The Ohio Machine Tool Co.

Kenton, Ohio

OHIO



Milling Edges of 10 Steel Plates in One Set Up

ROTARY PLANERS

Our line of Rotary Planers consists of many styles and sizes for finishing the bases of Steel and Iron Columns, Structural Shapes, etc. They are being used in most of America's up-to-date machine shops for milling flat surfaces on engine and turbine bases, split fly wheels and similar castings of Iron, Steel or other metals.

They are built for fixed locations, and as portable machines for use in connection with large floor plates and on round base to permit swiveling for making angular cuts and eliminating congestion caused by swinging columns that are necessary where machines cannot be adjusted. All rotating parts carefully guarded to comply with the liability laws.

We also make special types of rotary planers for milling the outside of crankshaft cheeks. Why not investigate our catalog No. 50, which contains details? Copy on request.

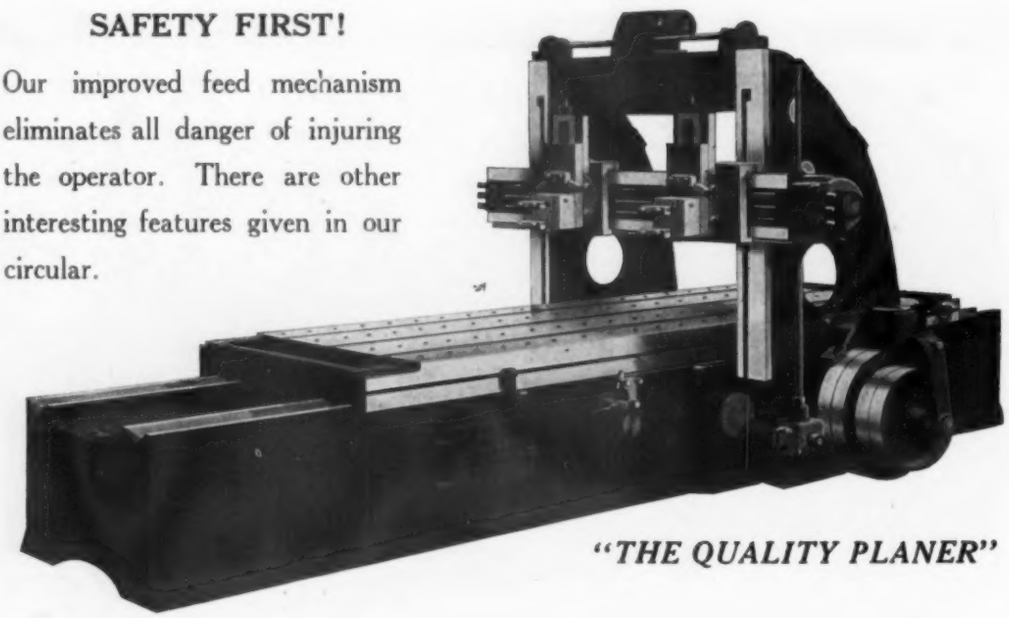
NEWTON MACHINE TOOL WORKS, Inc.

23d and VINE STREETS PHILADELPHIA, U. S. A.

THE LIBERTY PLANER FEED

SAFETY FIRST!

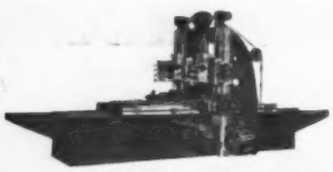
Our improved feed mechanism eliminates all danger of injuring the operator. There are other interesting features given in our circular.



"THE QUALITY PLANER"

THE LIBERTY MACHINE TOOL CO.

HAMILTON, OHIO, U. S. A.

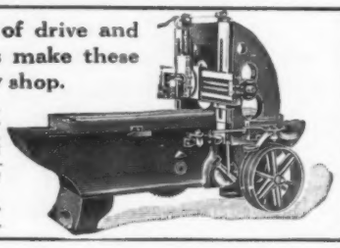


Conradson Multispeed Planing Machine

C. M. CONRADSON, Green Bay, Wis., U. S. A.

Strength, Simplicity of drive and cost cutting features make these tools winners in every shop.

Variable Speed Iron Planers, 24 in. x 24 in. up to 48 in. x 42 in. to plane any length, cutting speed 20 to 50 feet constant return. Special machinery to order. Catalog?

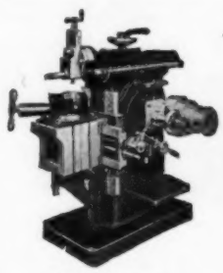


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Rochester N. Y.

Davis Shapers

14" Cone Pulley Drive. 16", 20" and 24" Gear Box drive.

Inverted "V" Ram, and patented construction doing away with link machine features.



14-in. Shaper

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Rochester, N. Y., U. S. A.

SHAPERS

Pillar—Traverse—Crank Planers

THE CINCINNATI SHAPER COMPANY
CINCINNATI, OHIO

STOCKBRIDGE

IS THE NAME OF A SHAPER BUILT AS WELL AS WE KNOW HOW

It has special labor-saving features found only on the Stockbridge two-piece crank Shaper

STOCKBRIDGE MACHINE CO., Worcester, Mass.

GOULD & EBERHARDT

"HIGH DUTY" SHAPERS
AUTOMATIC GEAR AND RACK CUTTING MACHINERY

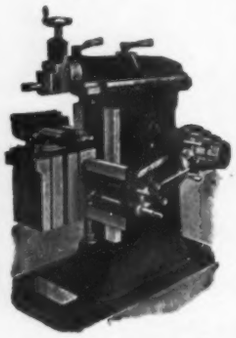
ESTABLISHED 1833 NEWARK, N.J. U.S.A.

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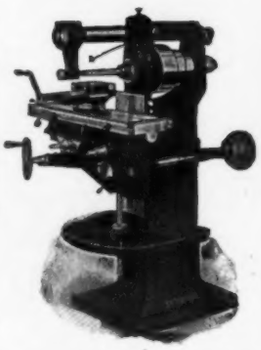
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STANDARDS AND GAUGES
MACHINISTS SMALL TOOLS

GENERAL OFFICES, 111 BROADWAY, NEW YORK
WORKS, HARTFORD, CONNECTICUT, U.S.A.

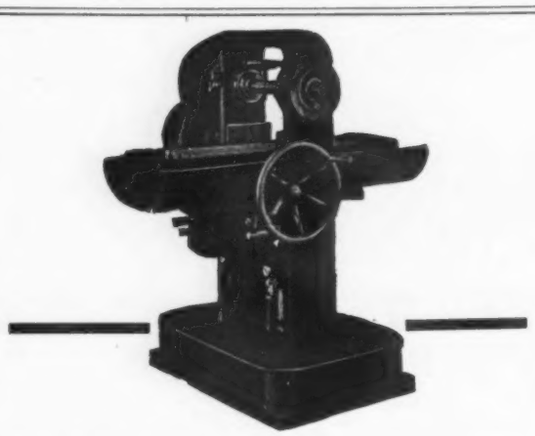
Steptoe Shapers and Milling Machines



Represent seventy-three years of experience in the manufacturing of High-Grade Machine Tools and thousands of machines in shops giving daily satisfaction are a guarantee of quality that should not be overlooked when buying your equipment.



The John Steptoe Company
Brighton Cincinnati, Ohio



Rifle Manufacturers Investigate This Miller

Its ability to mill small steel parts for aeroplanes, automobiles, rifles quickly and accurately to meet government specifications is unsurpassed. It is rigidly constructed and is provided witr eight changes of speed. The most prominent manufacturers of the country are using them. Catalog furnished promptly upon request. Write.

Gooley & Edlund, Inc., Cortland, New York

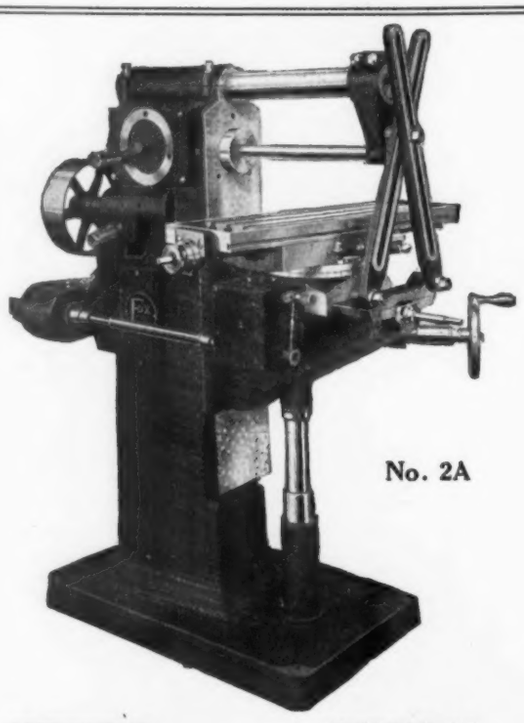
DOMESTIC AGENTS

Chandler & Farquhar Company, Boston, Mass.; Vandyck Churchill Company, New York, N. Y., and New Haven, Conn.; Swind Machinery Company, Philadelphia, Pa.; Syracuse Supply Company, Syracuse, N. Y.; O. R. Adams, Rochester, N. Y.; Brown & Zortman Machinery Company, Pittsburgh, Pa.; English & Miller Machinery Company, Detroit, Mich.; Federal Machinery Sales Company, Chicago, Ill.; Vonnegut Machinery Company, Indianapolis, Ind.; Cleveland Tool & Supply Co., Cleveland, O.; Bowman-Blackman Mach. Tool Co., St. Louis, Mo.

OVER-SEAS REPRESENTATIVE

ALMACO ALLIED MACHINERY COMPANY OF AMERICA 120 BROADWAY, NEW YORK, U.S.A. ALMACO

Paris, Turin, Zurich, Barcelona



No. 2A

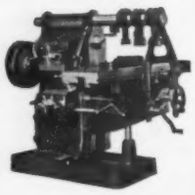
FOX UNIVERSAL MILLING MACHINE

Built with wide bearings and large surfaces and doubly braced to make it rigid enough to take deep cuts at high speed.

The operator's accuracy is facilitated by micrometer dials on the horizontal, vertical and transverse movements.

Our complete line of Milling Machines and Multiple Spindle Drills is illustrated in our new catalog. Write for a copy.

FOX MACHINE CO.
1809 W. Ganson Street Jackson, Mich.



THE CINCINNATI MILLING MACHINE COMPANY
CINCINNATI, OHIO
Plain, Universal and Vertical Milling Machines and Milling Cutter Sharpening Machines
See Display Advertisement in May 24 issue.

Threading Machines
Milling and Hobbing
MOLINE TOOL CO., Moline, Ill.

Milling Machines
Milling Cutters Special Tools
Cleveland Milling Machine Co. Cleveland, O.

A Capable Corner

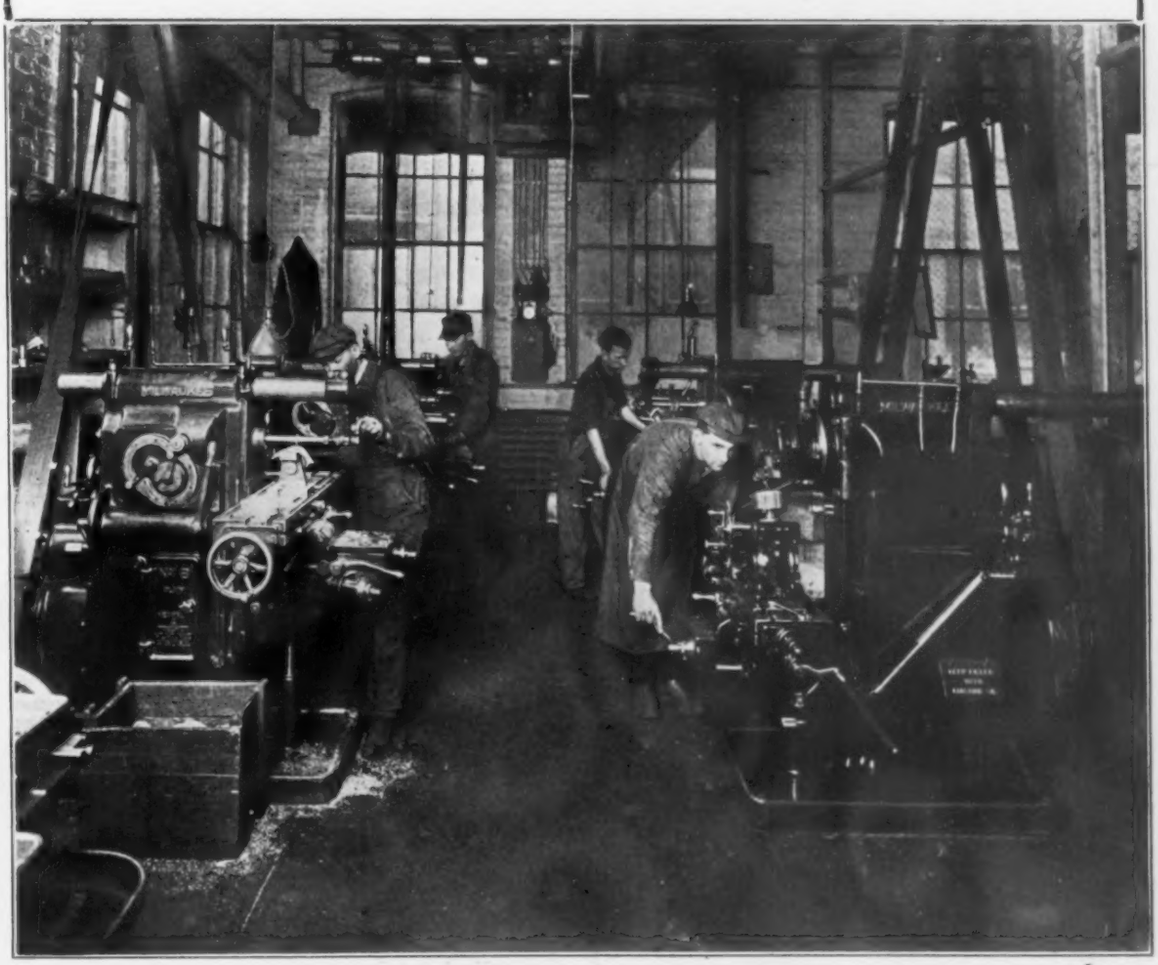
Capable because it is filled with Milwaukee Milling Machines which with their attachments cover a wide variety of work from the regular line of milling to the intricate tool, jig, fixture and die work that may be required by exacting engineering.

Milwaukee Milling Machines have one piece, box section, heavily ribbed column of semi-steel with few and small openings—box section semi-steel knee with solid top and extended bearings—flanged spindle with patented arbor drive collar allowing positive drive for arbor and removing strain from taper hole in spindle—automatic flooded lubrication of all gears and bearings in column and feed box—automatic lubrication for cutters—all of which makes for profitable production.

Send for catalog No. 20.

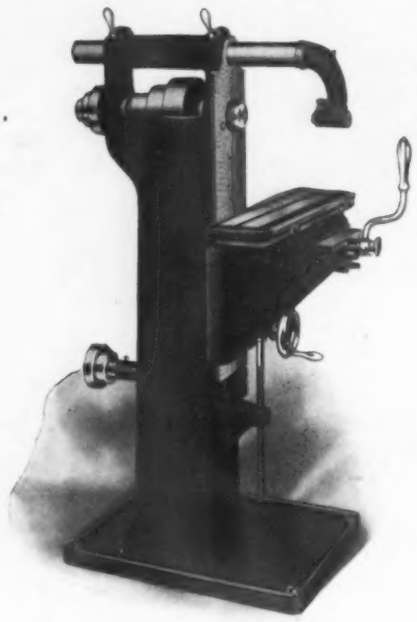
KEARNEY & TRECKER CO.

MILWAUKEE, WIS.



GARVIN

No. 11 Plain Milling Machine



No. 11 Plain Milling Machine

Use Code.....Abode
Adjustments.....12½ x 4½ x 10 in.

This machine is adapted to the lightest kinds of small milling and light manufacturing, and suitable for jewelers, makers of electrical goods, brass workers, sewing machine manufacturers and others.

The power feed of this machine is driven by a vertical worm shaft inside of column, which drives a worm gear clutched to the pinion shaft in the knee. The feed works are located and protected inside of column.

Among the many features of the machine is the quick and sensitive movement of table by adjustable lever and rack pinion, and the micrometer adjustments of knee and saddle.

Send for Circular No. 247.

For Further Information Ask Your Dealer or Write Us Direct

MANUFACTURED BY

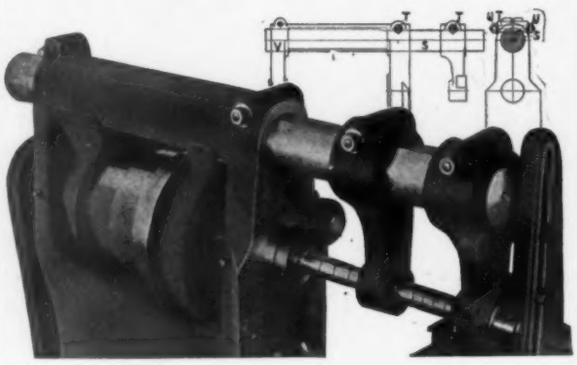
The Garvin Machine Co.

Spring and Varick Streets

50 Years in New York City Visitors Welcome

KEMPSMITH

Milling Machines



The Kempsmith overhanging arm provides for positive alignment of the arbor or boring bar and at the same time serves to hold the cutter positively to its work. The photograph and line drawing show how it operates.

Write for Catalog "B"

The Kempsmith Manufacturing Co.

Milwaukee, U. S. A.

MACHINE TOOLS Bilton BRIDGEPORT

BILTON — Automatic Gear Millers, Gear Hobbers for cutting spur, bevel, spiral and worm gears. Worms and special shapes. Capacities 10" dia., 8 pitch. Exclusive features on machines to promote high production and insure accuracy.

Ask for catalogue No. 25

THE BILTON MACHINE TOOL CO.

BRIDGEPORT, CONN.

UNDERWOOD

PORTABLE TOOLS

Time Savers for Railway and Machine Shops

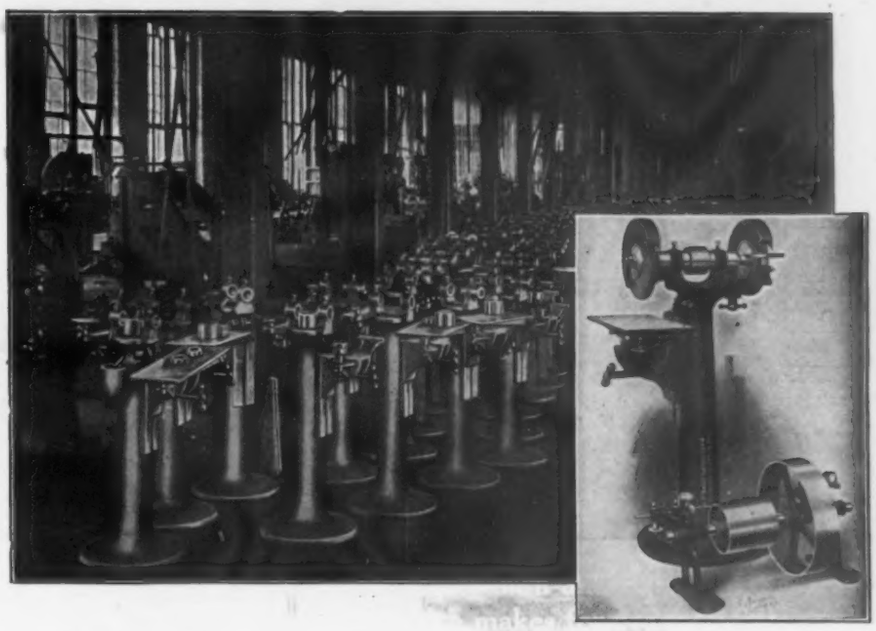
The Underwood Portable Tools do the repair work ordinarily put on special machines. There's no need hauling large massive repair jobs to the machines.

In many cases the time saved more than pays for the tools. We make over 50 such tools. Write for our catalog.

H. B. Underwood & Co.

Philadelphia, Pa.

The Waterbury Grinder



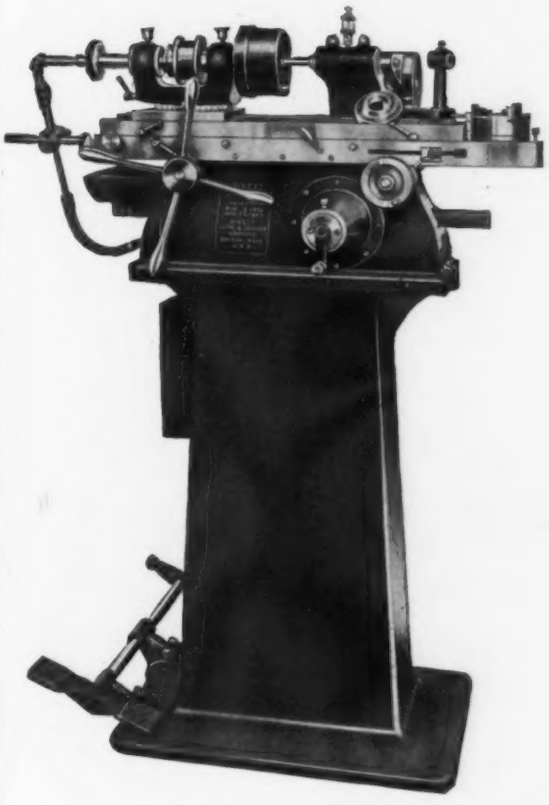
Designed for general tool-room service, grinding flat surfaces, such as blanking, stamping and piercing dies; punches, lathe and planer tools, and all similar work that is ordinarily done on a grinder.

Made sturdy, strong and simply. Built and sold in large quantities; that's why we can keep the cost so low.

Write for details.

The Blake & Johnson Company

Waterbury, Conn.



Accurate—Yet Capable Of Volume Production

The Rivett No. 103 Internal Grinder is adapted not only for tool room, model and experimental departments, where accuracy is of prime importance, but also for the manufacturing departments where volume production must be obtained without sacrificing accuracy.

Rivett Lathe & Grinder Co.

Brighton District Boston, Mass.

RIVETT Quality

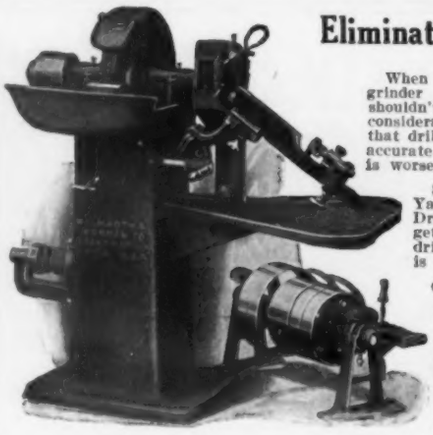


RANSOM
Patent Speed Controller

This is no regulator that you "Guess" may be set correctly. You cannot *possibly* overspeed your wheels. On account of this safety feature, we are able to get 75 to 100% speed variation. This amount of variation nor any amount of speed variation is safe unless you have the Ransom Patent Speed Controller.

Want to know more about it?

RANSOM MANFG. CO.
OSHKOSH, WIS.



Eliminates Waste

When buying a drill grinder the first cost shouldn't be the only consideration. A drill that drills over-sized, inaccurate or conical holes is worse than useless.

Specify a New Yankee Wet or Dry Drill Grinder and get a standard of drilling work that is unsurpassed.

Get our catalog.

Wilmarth & Morman Company
1190 Monroe Ave. N. W.
Grand Rapids, Mich.

Combination Wet and Dry Grinder



A Complete Wet Tool Grinder on one end and Dry Grinder for all-around grinding on the other end.

We have been shipping them out for eight years, all giving satisfaction.

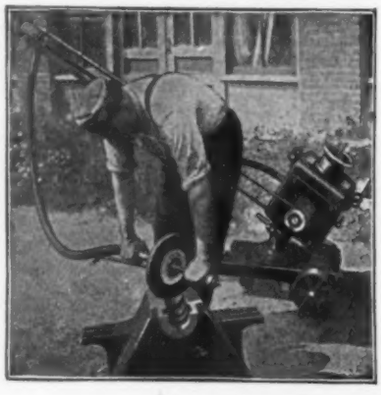
Let us know your wants in the grinding line.

The Bridgeport Safety Emery Wheel Co., Inc.
BRIDGEPORT, CONN., U. S. A.

UNIVERSAL PLAIN



Stow Flexible Grinder



Adjustable All Sizes

All currents, furnished for drilling when desired.

Write for catalogue No. 102.

Stow Manufacturing Company
Binghamton, N.Y. U. S. A.

Oldest portable tool manufacturer in America

THOMPSON
UNIVERSAL GRINDING MACHINES
SEND FOR CIRCULARS
THE THOMPSON GRINDER CO.
SPRINGFIELD, - - OHIO

GARDNER
DISC GRINDING MACHINERY
for all purposes
GARDNER MACHINE CO.
BELOIT WISCONSIN

Grand Rapids No. 2

A really UNIVERSAL grinding machine. One man can grind drills on it—another man can grind cutters, reamers, etc., without any interference.

Fully described in Bulletin No. 2.

Grand Rapids Grinding Machine Co.
Grand Rapids, Michigan, U. S. A.



BLANCHARD
HIGH POWER VERTICAL
SURFACE GRINDERS

are not only initially accurate but are so constructed that their accuracy can be readily maintained. This, together with their greater production, makes them most economical.

The Blanchard Machine Company
Cambridge A Mass.



Sharpen Band Saws with ALUNDUM

An ALUNDUM wheel 1/32 inch thick at work sharpening a fine tooth, metal cutting band-saw.

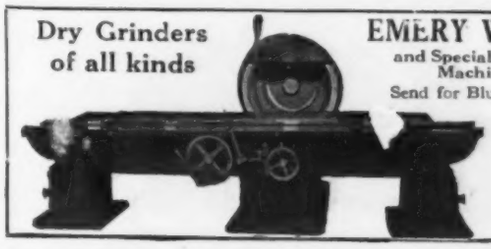
The wheel goes down the face of the tooth and up the back of the following one, grinding each tooth to the same shape and size, and giving it that sharp and keen cutting edge that will "stand up" under hard service.

NORTON COMPANY
WORCESTER, MASS.

New York Store
151 Chambers Street

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865



Dry Grinders of all kinds

EMERY WHEELS
and Special Grinding Machinery
Send for Blue Catalog
The Springfield Mfg. Co.
Bridgeport Conn.
321 Mountain Grove Ave.

BESLY
CHICAGO

Besly Disc Grinders
and Ring Wheel Grinders
The largest and most extensive line on the market.
Write today for
Besly's Modern Disc Grinding Practice —it is free.

WHEELS THAT GRIND

This means high-class service and lower grinding cost.

PITTSBURGH GRINDING WHEEL CO.
ROCHESTER, PA.

AUTOMATIC SPUR GEAR
CUTTING MACHINERY
CUTTER GRINDERS
THE CINCINNATI GEAR CUTTING MACHINE CO.
CINCINNATI, OHIO

STERLING

STERLING WHEELS
Are Good Wheels
Sterling Grinding Wheel Co.
TIFFIN, OHIO, U. S. A.

***SPEED*—If you want speed**

Prompt deliveries in these rush times are little short of miraculous. Nevertheless when a manufacturer sends in a distress call that he must have grinding wheels in a rush we're right on the job.

Big plants are depending on Halite Grinding Wheels and Pennsylvania Grinding Wheel Service to get them out of their difficulties.

Put that grinding wheel problem up to us. Don't delay—write, wire or 'phone, to-day.

Pennsylvania Grinding Wheel Co.
Philadelphia, Penna.

Emery Wheel Dressers



No. 1 for Regular Shop Use

These Dressers in connection with our Cutters make a most powerful and efficient tool, especially our No. 0, for small wheels 6 inches and under, and No. 2, which is made proportionately larger and stronger for large wheels.

CUTTERS

We make the regular "Huntington" (pattern) for No. 0 and "Huntington" pattern Paragon Cutter and Roughing Cutter for Dresser No. 1 and the "Huntington" (pattern) and Roughing Cutters for Dresser No. 2.

Let us send you descriptive circular and prices

GEO. H. CALDER, Lancaster, Pa., U. S. A.



For Large, Coarse Wheels

The Desmond-Huntington is in a class by itself when it comes to dressing large, coarse wheels. Not only is it extremely rapid in operation, but its strong, sturdy construction insures long, satisfactory service.

Send for this dresser on approval. Made in three sizes.

DESMOND-STEPHAN MFG. CO. - Urbana, O.

Manufacturers of the Diamo-Carbo Emery Wheel Dresser

ALFRED HERBERT, Limited, Coventry, England. Agent for Great Britain

The Canadian Desmond-Stephan Mfg. Co., Ltd., Hamilton, Ont., Distributors for Canada.

Cutting Off Machine

For Tubes

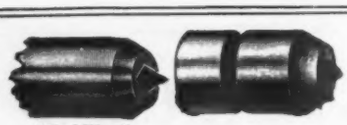
with lever gripping chuck



Tube Mill Machinery (Seamless and Welded)
Rolling Mill Equipment
Rolls (Sand and Chilled)
Pipe Threading Machinery
Castings—gray iron, semi-steel, cupola and air furnace
Machine work to drawings

Standard Engineering Co.

ELLWOOD CITY, PA., U. S. A.



"End View"

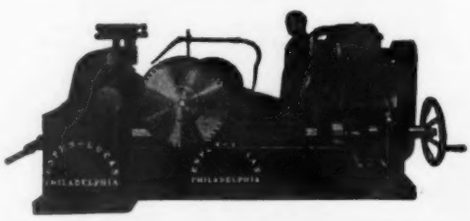
For Truing Grinding Wheels

Francis Diamond Hand and Grinder Tools always give entire satisfaction. The diamonds in these tools are of the hardest and best quality and set very securely.

Length of Hand Tool shown here 11½ in. over all. Rosewood handle. Let us send you an assortment for selection.

Francis & Co.

Hartford - - - Conn.



190 Sizes and Types of Cold Saw Cutting Off Machines for Sawing All Kinds of Metal

THE ESPEN-LUCAS MACHINE WORKS

Front and Girard Ave., PHILADELPHIA, PENNA.



DICKINSON "Diamond"

Tools for truing Large, Coarse and Hard Emery, Corundum, Carborundum, Alundum, Crystolon or other abrasive wheels will give the greatest amount of service with a minimum of wear on the diamond. Diamonds can be set in any style of holder desired. We have had a great many years' experience in the manufacture of Diamond tools and are thoroughly familiar with what is required of them.

THOS. L. DICKINSON, 62 Nassau St., N. Y.
Established 1796. Successor to John Dickinson.
C. W. Burton Griffiths & Co., London, Sole Agents for Great Britain.

Cochrane-Bly Company

Rochester, N. Y., U. S. A.

Manufacturers of

METAL SAWING MACHINES

(COLD SAWS)

Made in five sizes to cover every manufacturing requirement. Their thin milling saws combine high speed with the closest economy in high-priced steel.

AUTOMATIC SAW SHARPENERS

For saws 11" to 32" diameter. They grind and bevel at one operation the high and low tooth type milling saw.

DIE FILING MACHINES

Made in two sizes for the accurate filing of dies, punches, metal patterns, jigs and special gauges, and for filing duplicate parts requiring close finish.

UNIVERSAL DIE SHAPER

For die making and general tool room work. Operates both shaper ram and milling spindle at any angle.

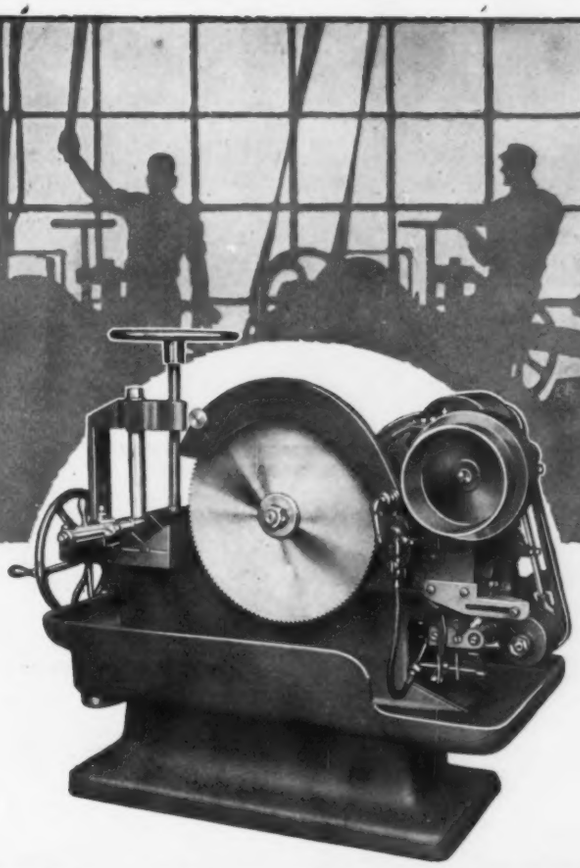
When considering this class of equipment would appreciate being consulted.

over 2000 in use

HIGLEY METAL SAWS

Vandyck Churchill Company

New York New Haven Philadelphia



A Quick Get-Away Means a Fast Finish

Nutter and Barnes Automatic Metal Cutting-Off Machines give your product a big lead at the start, and with a good start the race is half won.

Don't permit inferior stock-cutting equipment to hinder capacity production now, when every minute counts.

Nutter and Barnes Cutting-Off Machines are giving satisfaction day and night in many munitions plants. They have the confidence of the United States Government. They can help you.

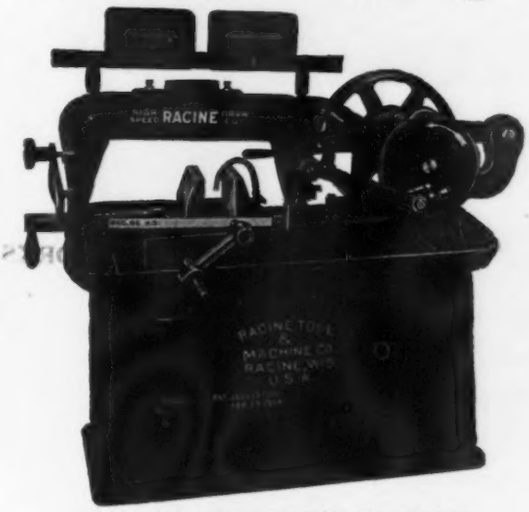
Made in four sizes, cutting stock to 12". Write for descriptive circulars and new Machine Tool Catalog No. 39.

(We can deliver a few 4" Machines at Once.)

Machine Tool Division
GREENFIELD TAP & DIE CORPORATION
Greenfield, Massachusetts, U. S. A.

G T D

Speed and Economy in Metal Cutting



"Racine" High Speed Metal Cutting Machine

One distinctive feature of the

RACINE HIGH SPEED METAL CUTTING MACHINE

is the positive automatic lifting device. It lifts the blade clear of the work on the non-cutting stroke, thereby conserving the blade and increasing output.

Built in various sizes, each embodying the features that mean speed, sturdiness and economy.

Test the Racine at your own plant and buy it only on the basis of economy.

Let us send our Catalog F.

Racine Tool & Machine Co.
Racine, Wis., U. S. A.

Peerless HIGH SPEED

The saw which has revolutionized metal cutting and created a new standard by increasing production 50 to 100 per cent.



Here's an example of how it works out:

Some time ago we solicited one of the very large concerns of the country (name on request), who were very skeptical as to our ability to improve upon their so-called standard equipment.

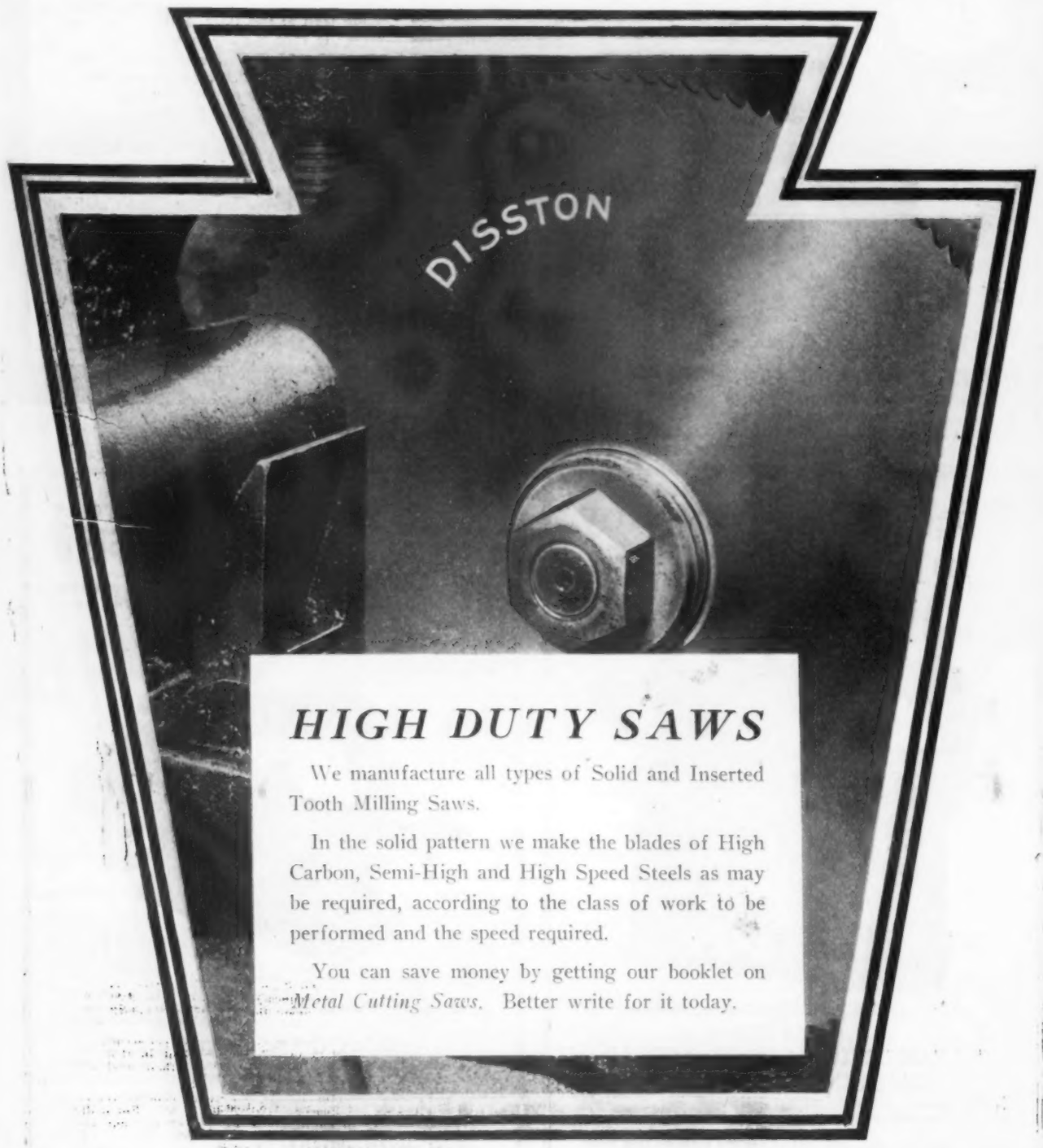
It was less than two years ago, after much persuasion, that they consented to install one "Peerless," but in that short time several repeat orders have already run their total up to sixteen of our 6-inch machines.

This is not an exceptional case, nor is the concern referred to the largest user of Peerless High-Speed Saws. But it illustrates how quickly the new standard supplants the old wherever and whenever it is given the opportunity.

Order a "Peerless" on 30 days' trial. If it fails to make good we pay freight both ways.

PEERLESS MACHINE CO.
1613 Racine St., RACINE, WISCONSIN





HIGH DUTY SAWS

We manufacture all types of Solid and Inserted Tooth Milling Saws.

In the solid pattern we make the blades of High Carbon, Semi-High and High Speed Steels as may be required, according to the class of work to be performed and the speed required.

You can save money by getting our booklet on *Metal Cutting Saws*. Better write for it today.

HENRY DISSTON & SONS, Incorporated

PHILADELPHIA Established 1840 U. S. A.

ATKINS "AAA"

Hack Saw Blades



Atkins "AAA" Blades for Hand Frame use are made absolutely Non-Breakable. These wonder-working Blades withstand twisting strains at the same time having cutting edges equal to any "all-hard" Blades.

Atkins Blades for Power Machines meet the requirements of the most exacting users. They cut faster giving maximum service at lower cost. The secret lies in the Atkins formula for Hack Saw Steel.

We welcome any test you care to make with "AAA" Blades and will gladly furnish samples for the purpose.

Address Trade Service Department for Metal Saw Booklet "1A"

E. C. Atkins & Co., Inc.

ESTABLISHED IN 1857

"ATKINS ALWAYS AHEAD"

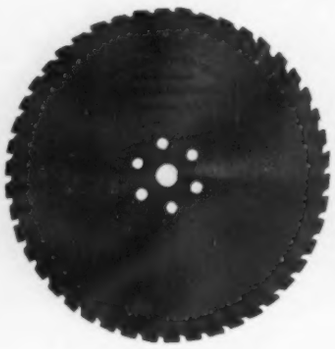
Home Office and Factory: Indianapolis, Ind.

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Branches carrying complete stocks in all large distributing centers as follows:

Atlanta	Memphis	New Orleans	Portland, Ore.
Seattle	Sydney, N. S. W.	Chicago	Minneapolis
New York City	San Francisco	Vancouver	Paris, France





THE HUNTER
"DUPLEX"
INSERTED
TOOTH SAW BLADES



For ARBOR and SPROCKET DRIVEN MACHINES

Made with a greater number of teeth than any other blade and used for cutting all kinds of metal.

Teeth are made of High Speed Steel. Plate of Oil Treated Vanadium Steel. Manufactured in sizes from 10" to 90" diameter.

Hot Saws, Friction Discs, Solid Blades made of Vanadium, Tungsten and Chrome Alloy Steels. Saw Sharpening Machines. Inserted Tooth Blades and Grinders. Hardened Steel Specialties.

Write for prices.

HUNTER SAW & MACHINE COMPANY
PITTSBURGH, PA., U. S. A.

Lea-Simplex Cold Saw



—the cost is surprising in view of its speed

The Earle Gear & Machine Co.
4703 Stenton Ave. Philadelphia



VICTOR SAW WORKS
FORMERLY—MASSACHUSETTS SAW WORKS
SPRINGFIELD, MASS,
U.S.A.

Marvel No. 8 Metal Band Saw



A distinct improvement over all old styles. First class throughout. The large, roomy table, the device for adjusting blade feed to suit thickness of material, the device for cutting on an angle when desired with many other improvements make this machine a real pleasure to work with. All users are highly pleased with it.

Send for circular.

Armstrong - Blum Manufacturing Co.
349 N. Francisco Ave., Chicag , Ill.

"MILFORD" HACK SAW BLADES



"Go By The Name"

Sample Sent on Request
The Henry G. Thompson & Son Co., New Haven, Conn.

Ohlen Metal Band Saws

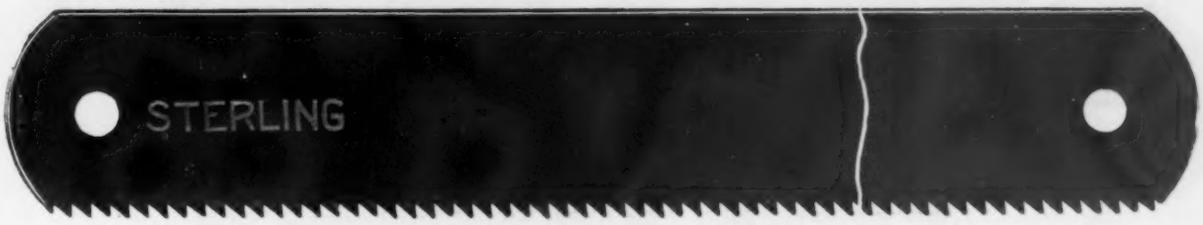
Made from special steel carefully tempered to withstand severe usage. Ohlen saws have proved to be the best by various tests.

Catalog illustrates saws for every purpose.

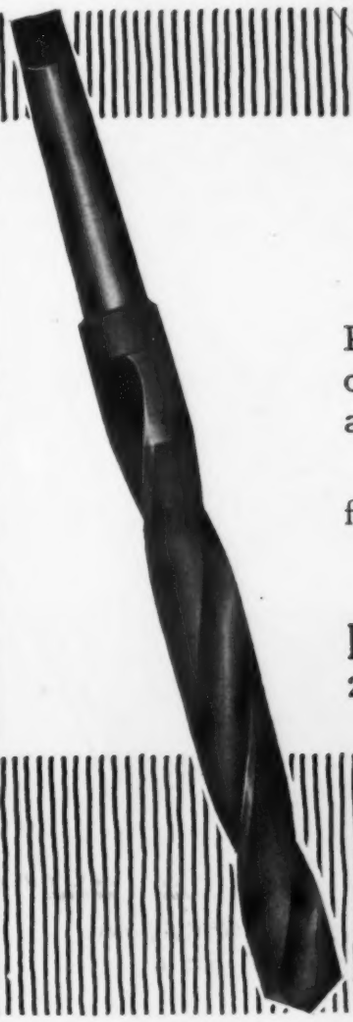
THE JAMES OHLEN & SONS SAW MFG. CO.
COLUMBUS, OHIO

Branch Offices: Atlanta, Ga. St. Louis, Mo.
Portland, Ore. New York, N. Y. San Francisco, Cal.

HACK "STERLING" SAWS



DIAMOND SAW AND STAMPING WORKS
BUFFALO, N. Y., U. S. A.



Reliance Service

One factor of Reliance Service is Prompt Delivery. We see to it that our stock of High Speed Twist Drills is always complete.

Milling cutters, to your exact specification, made on ten days' notice.

Have you our quotations?

Reliance Steel & Tool Co.
24-26 Murray St. New York City

DRILLS—REAMERS—CUTTERS—TAPS—TOOLS

High Speed and Carbon

We devote all our attention to these lines and carry a Complete Stock for Immediate Delivery.

The Cleveland Power Transmission Co.
Cleveland, Ohio

ART CO.

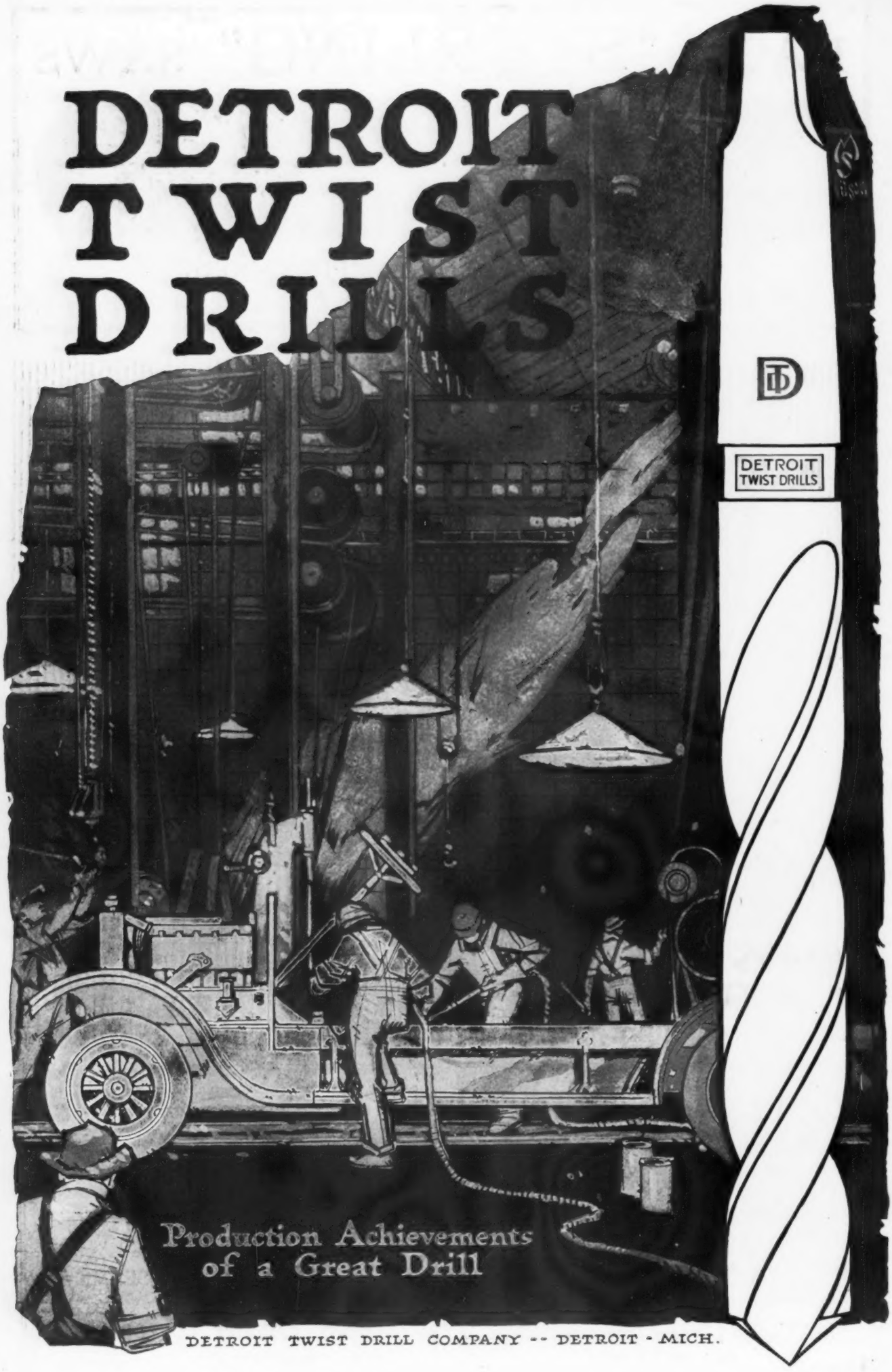
QUALITY TOOLS

REAMERS, MILLING CUTTERS and SPECIAL TOOLS

QUALITY, ACCURACY, SERVICE

Alvord Reamer & Tool Co.
Millersburg, Pa.

DETROIT TWIST DRILLS



Production Achievements of a Great Drill

DETROIT TWIST DRILL COMPANY -- DETROIT - MICH.

THE MARTELL
System of Line Reaming

Gives Perfect Alignment and Size



Especially adapted for manufacturing and repair work on gas engine crank-shaft bearings, line reaming the bearings of motor generator sets, aligning lathe head and tail stock bearings, milling machine spindles, etc., etc.

Saves
from 50% to 80% Over Hand Scraping Method

By this method an operator may hand ream all of the main bearings of multiple cylinder gas engines simultaneously. No hand scraping necessary. Adjustments for size can be accurately and quickly made by means of a micrometer scale. Write for Bulletin No. 101F, which describes the tool and its operation.

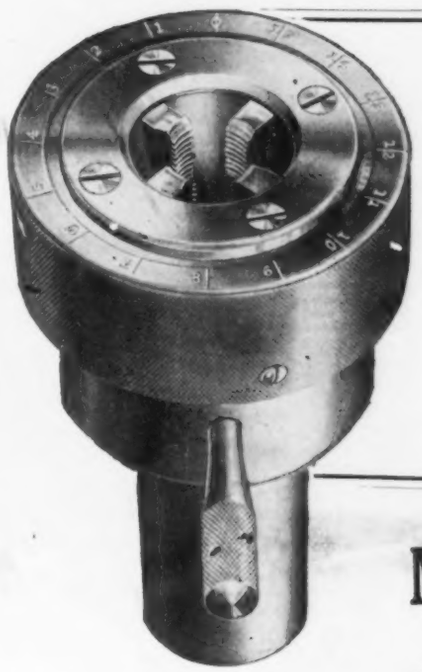
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TAFT-PEIRCE
Woonsocket, R.I., U.S.A.

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2035

Murchey Tools



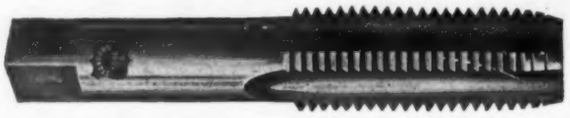
Murchey Taps and Dies are strong, yet light. The best of materials and workmanship are embodied in their construction. They are of simple design with but few parts to get out of order.

If you have any threading work to do enlist the aid of Murchey Tools in your cause.

The firms making shells for Uncle Sam are using Murchey Tools and are getting the most efficient results.

Murchey Machine & Tool Co.
92 PORTER STREET
DETROIT MICHIGAN

TAPS



Compare our taps with any other make
and both of us will be well pleased.

THE STANDARD TOOL CO

CLEVELAND

NEW YORK: 94 Reade Street CHICAGO: 552 West Washington Blvd.

Critchley Improved Expanding Reamer

Jobbers' Small Set

Sizes: A to H
$\frac{11}{32}$ to $1\frac{1}{16}$

List $39.80



A full set of these tools, sizes A to Q, will ream any possible size hole from 15/32 to 4 1/16 inches.

A sufficient overlapping of sizes is provided to allow regrinding.

Range of sizes stamped on each tool.

Made by

Cutter & Wood Supply Co.
Boston, Mass.

ACORN DIES



Accuracy in Thread Cutting

The Acorn Die has proved itself a very accurate threading die—due to the improved method of adjusting.

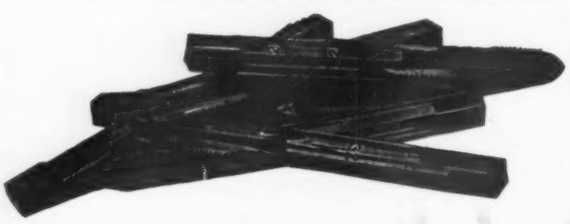
Adjustment is obtained by turning the cap which threads onto the body and forces the prongs toward the center. Simple, positive and accurate.

Easily adjusted and easily sharpened. Simple and compact.

Different styles of holders adapt the die to all machines.

Details in our Acorn Die booklet. Send for a copy today.

Greenfield Tap and Die Corporation
Greenfield, Mass., U. S. A.
New York, 28 Warren St. Chicago, 13 South Clinton St.
Canadian Plant, Wells Brothers Company of Canada, Limited, Galt, Ontario



The Brubaker Name

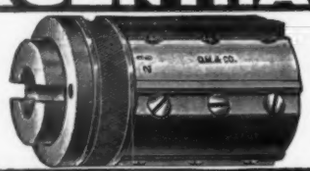
Our name has never been linked with an unsatisfactory tool. Brubaker Taps and Reamers always deliver the goods. They are built with the ability in them to tackle the hardest job and make it easy. They have the quality, accuracy, and durability that satisfy. May we put you on our mailing list?

Catalog No. 3 now ready.

W. L. BRUBAKER & BROS., Millersburg, Pa.
New York: 50 Church Street

MERGENTHALER

ADJUSTABLE REAMERS



MILLING CUTTERS AND TAPS SEND FOR CATALOG

THE MERGENTHALER CO. BALTIMORE, MD.

8000 Taper Holes Reamed

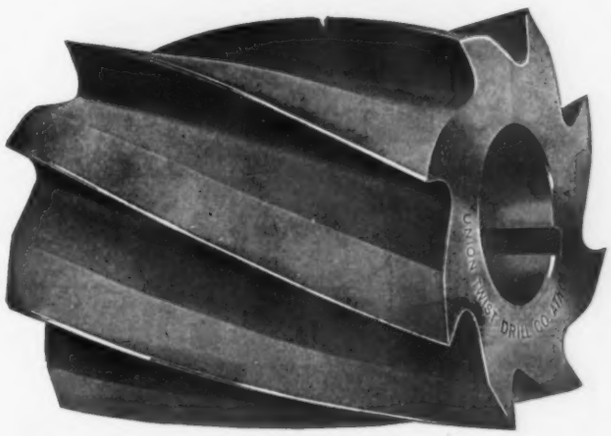
IN NICKEL STEEL PINIONS WITH ONE SETTING



Skelton Patented Reamer

Interchangeable high-speed blades. Immediate Deliveries.

Skelton Sales Co.
Syracuse, N. Y.



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The tool is stamped "UNION"—that's enough anyone need to know. That's enough for most buyers of small tools.

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The finest carbon and high speed steel we can buy.

The finest workmen that can be hired. Price is no factor with us.

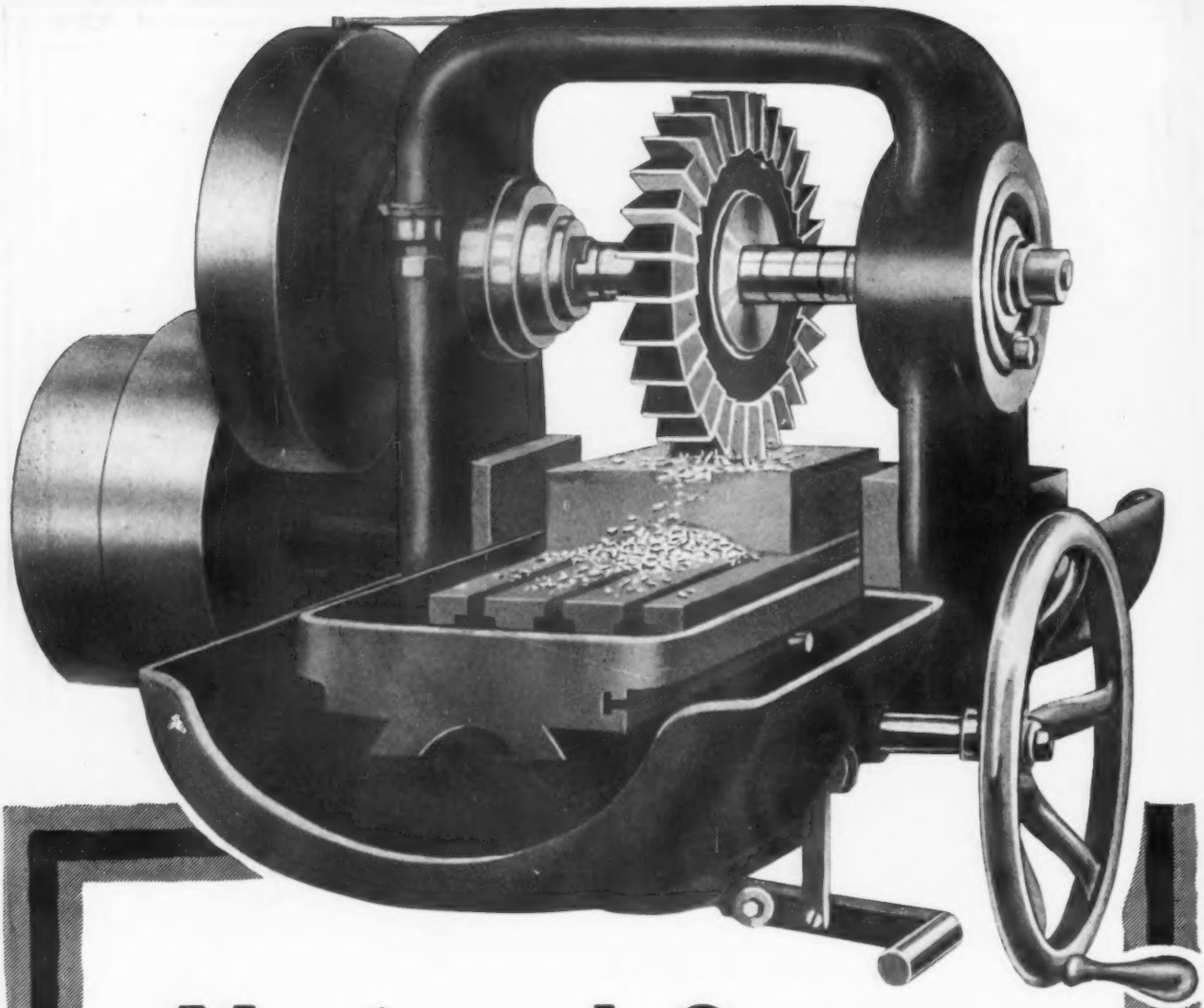
The finest equipment our Research Department can secure.

These things make "UNION" *the* standard small tools of today.

"The Tools You Buy Again"

Union Twist Drill Co.

Athol, Mass.



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MAKE THE CHIPS FLY

Equip your milling machine with NATIONAL CLEVELAND CUTTERS. Note how they do that heavy work with ease and speed. Watch how the production figures take a jump.

NATIONAL CLEVELAND CUTTERS do not dull quickly. They need fewer grindings, which means bigger production, less time wasted and longer life of tools.

Our catalog illustrates the complete line of National Cleveland Milling Cutters and Special Tools. Get a copy.

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Various sizes and styles of milling cutters. Also complete stock of Taps, High Speed and Carbon Drills, Micrometers, Drill Chucks, Reamers and Special Tools. Prompt deliveries.

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Machinery Tools and Supplies
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Milling Cutters—Reamers
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The Advance Tool Co.
CINCINNATI, OHIO, U. S. A.

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For Durability



Plain Milling Cutters.
Side Milling Cutters.
End Mills.
Angular Cutters.
Convex and Concave Cutters.
Formed Milling Cutters.
Special Cutters.
High Speed Steel.

Quality First
COWLES TOOL COMPANY, Cleveland, Ohio, U.S.A.

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At One-Tenth What it Cost You to Make Them by Hand

SPACERS FOR MILLING MACHINE ARBORS, ETC.

For Arbors of the following diameters:

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Prices and samples on request.

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Our quick operating expanding mandrels are efficient time savers. They assure uniform wall thickness and increased production. They are used extensively in this country and Europe on various size shells and give universal satisfaction. All steel construction, hardened and ground. Intended for constant hard usage. Grip regulated automatically by size of cut. Lock and release instantly with slight effort by the operator. Made from 75 mm. to 12 inches. We also make nose drivers for various size shells. Write for prices and deliveries.

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Ten minutes from lower New York City



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Lovejoy Boring, Turning, Facing and Planing Tools are designed to withstand the continuous strains of present day feeds and speeds. They are all positively locked type, which makes it impossible for the cutter to slip or loosen when taking heavy intermittent cuts.
All cutters made from the very best grades of high speed steel carefully heat treated by the best methods. Write for booklet.

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HOLLOW MILLS

Special Screw Machine

Hollow mills, reamers and counterbores. Write

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Phone: Franklin 2963-4

Finished Machine Keys Ready To Drive Gib Head and Headless

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McCrosky Cost Cutting Tools represent the difference between the old way of doing things and the modern American way of attaining maximum efficiency.
McCrosky Adjustable Reamers are infinitely more economical and efficient than solid fluted Reamers.
Wizard Quick-Change Chucks and Collets revolutionize Drill Press Work.
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WHITON "SOLID BODY" Geared Scroll CHUCKS

In all manufacturing where circular pieces are to be held in succession for duplicate chucking operations the Universal Geared Scroll Chuck is indispensable on account of its convenience, gripping power, durability and low price. The Whiton Geared Scroll Chucks are made in ten sizes, from 2½ to 15 in., inclusive. The distinctive difference between these chucks and other makes is shown in our catalog, which is sent free.



The D. E. WHITON MACHINE CO., NEW LONDON, CONN., U. S. A.

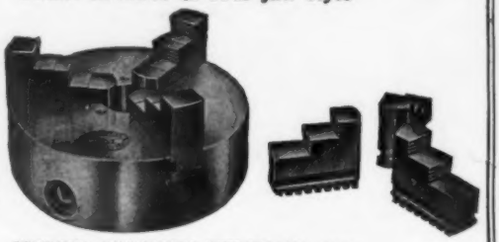
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UNIVERSAL GEARED SCROLL CHUCKS ARE ACCURATE AND SUBSTANTIAL

We furnish this chuck regularly with iron or steel bodies in three or four jaw style

Two Sets of Jaws



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Makers of a Complete Line of Chucks

Why are you invited to inquire into

Sweetland Chuck Service?



Because it offers you something worth while.

The Hoggson & Pettis Mfg. Co., New Haven Conn.

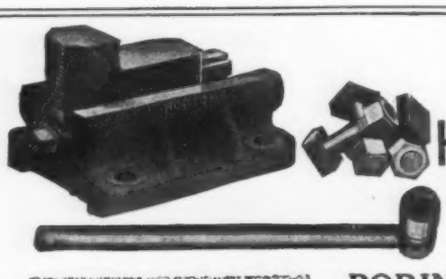
"CUSHMAN" CHUCKS AND FACE PLATE JAWS

We manufacture nothing but chucks and their accessories and would like to send you copy of our catalog.

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FOR HEAVY DUTY

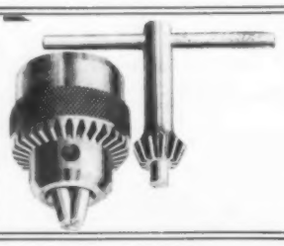
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Either Iron or Steel Body

Easily attached. Designed for hard service. Screws of extra large diameter double thrust bearing. We make chucks and jaws for every purpose. Send for a copy of Catalog No. 16.

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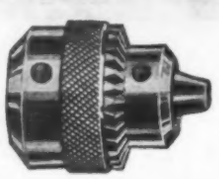


PARKER

High Speed Drill Chucks

Parker Mfg. Company

Ann Arbor, Mich.



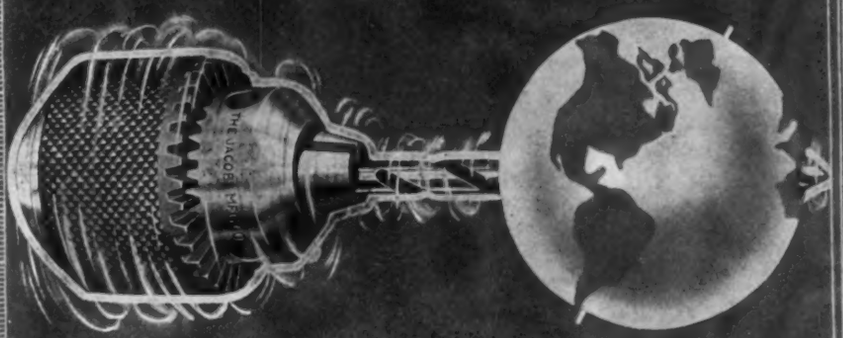
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Machinists' Tools, Drill Chucks, Drills, Wrenches, etc.
Micrometers
IMMEDIATE DELIVERY

JACOBS IMPROVED DRILL CHUCK

"Known throughout the World"



It's easy and convenient to open and close them quickly—requiring a mere twist of the wrist with the ever-ready key.

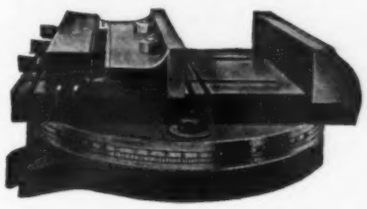
They hold drills firmly and accurately on center.

Their working qualities are unsurpassed.

Their proven superiority is the reason why they are so universally found in modern shops throughout the world.

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SKINNER PLANER CHUCKS



The heaviest and strongest Planer Chucks built

Absolutely guaranteed.

Why strap work on a planer? Use a Skinner Planer Chuck. Save time. Once it grips there's never a slip.
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GARVIN HEX-SQUARE TWO-WAY FIXTURE

For butt or straddle milling of a square or hexagon nature.

Will clamp in either a vertical or horizontal position.

Made in two sizes:
1" size—¼" to 1" cap.
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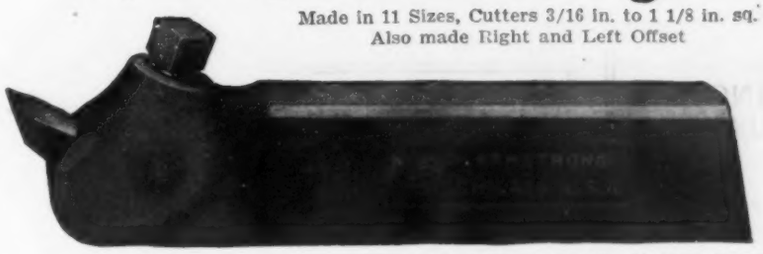
THE GARVIN MACHINE COMPANY

Spring and Varick Sts. 50 Years in NEW YORK CITY

CONSERVE YOUR HIGH SPEED STEEL

By Using Armstrong Tool Holders

Made in 11 Sizes, Cutters 3/16 in. to 1 1/8 in. sq.
Also made Right and Left Offset



ONE POUND

WILL DO THE WORK OF TEN LBS. IN FORGED TOOLS

Other advantages explained in catalogue.
Do you want one?

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Armstrong Tool Holders won the Only Panama-Pacific GRAND PRIZE awarded in the Tool Holder class.

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HIGHEST GRADE FILE MADE. THE FILE YOU WILL EVENTUALLY USE

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offer unusual opportunities for large savings when used in connection with PLANERS, MILLING MACHINES, GRINDING MACHINES, LATHES.

Ask for particulars.

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"NEW EASY" **BOLT CLIPPERS** "EASY"

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3 STYLES 5 SIZES

H. K. PORTER Everett, Mass., U. S. A.

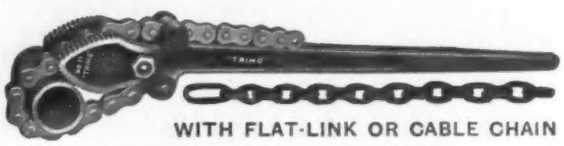
THE SERMON OF TRIMOISM IS SHORT AND EFFECTIVE



TRIMO PIPE WRENCH



TRIMO MONKEY WRENCH



WITH FLAT-LINK OR CABLE CHAIN

TRIMO CHAIN WRENCH

ITS TEXT IS VALUE.

ITS MORALS ARE ECONOMY, STRENGTH, DURABILITY.

ITS SUMMING UP IS WORK MADE EASY.

The story of the discouraged Mechanic and the Rusty Pipe has become a Fable.

Sample our Commercial Religion and be convinced.

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TRIMONT MANUFACTURING CO., 55 Armory St., Roxbury, Mass.
(BOSTON)



Any size in any of these styles:

Engineers' Wrenches, single head
Engineers' Wrenches, double head
Cap Screw Wrenches, Hexagon, single head
Cap Screw Wrenches, Hexagon, double head
"S" Wrenches, double head, all styles
Check Nut Wrenches, single head
Check Nut Wrenches, double head
General Purpose Wrenches
Textile Machine Wrenches
Angle Wrenches
Tool Post Wrenches
Set Screw Wrenches
Box Wrenches
Car Builders' Wrenches
Construction Wrenches
Bull Dog Wrenches
Twin Wrenches
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All kinds of wrenches in sets.

The W. & B. Wrench Family All Ready for Work

Wherever there's a nut or a bolt there's a W. & B. wrench made for a strong pull—on or off—with absolute dependability.

W. & B. drop forged steel wrenches have the maximum strength to do the work for which they are designed. They are not only fine in finish, but superior in performance, and are representative products of many years of justifiable reputation in exacting tool manufacture.

Send us your drawings and specifications for special drop forgings.

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Established 64 Years

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What the Chief



PURCHASING AGENT

"The first business before the board today is the matter of Pipe Wrenches.

"At our last meeting we decided to adopt one standard wrench for the entire plant.

"This policy was decided upon for two reasons—first, to simplify the matter of replacements; second, by having but one make of wrench our men would become more pro-



WALWORTH

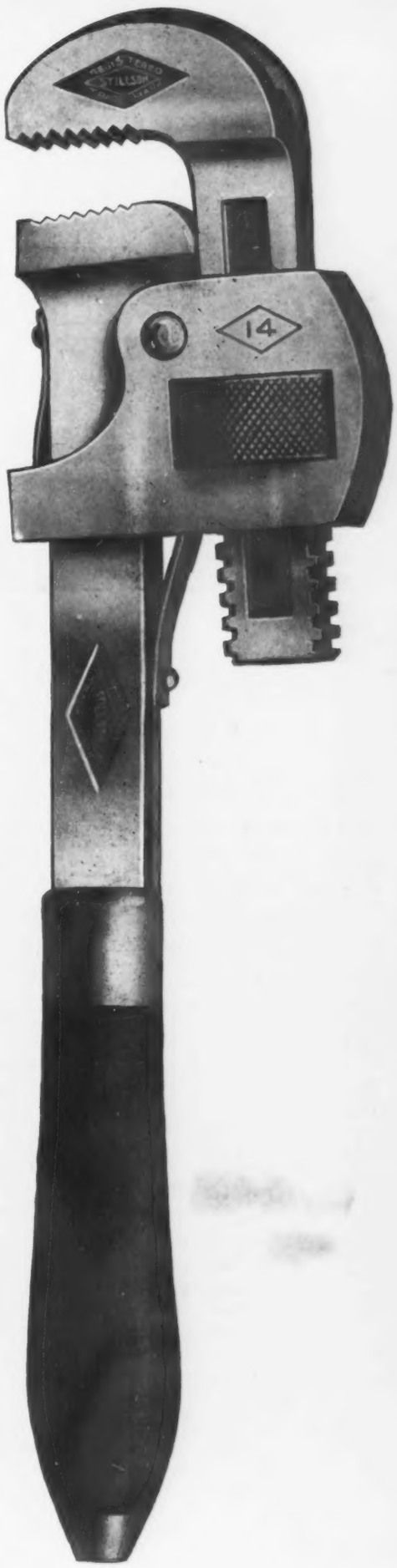
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BRANCHES:
New York, Chicago,
Boston, Seattle

General Offices and Eastern Division Works:
Boston, Mass.

BOS

Engineer Said—



ficient in its use, thus increasing production. We will now hear the report of our chief engineer on the subject."

CHIEF ENGINEER

"In carrying on my investigation of Pipe Wrenches I have not only looked up the various makes on the market, but have also gone over the records of the different kinds of wrenches in our plant today. I have given due consideration to both performance and repairs.

"After careful study I have come to the conclusion that the GENUINE WALWORTH STILLSON WRENCH is far superior to all others and I highly recommend its adoption.

"My decision has been guided by the excellent records in our own plant—by the manifest preference accorded it by our employees and because of the following facts:

"1. The GENUINE WALWORTH STILLSON WRENCH is the original pipe wrench and has good record for dependability that dates back 50 years.

"2. The parts of this wrench undergo special heat treatment to secure maximum durability combined with great strength.

"3. The powerful leverage of its rugged steel jaws will securely hold any shape, round, square or hexagon without slipping.

"4. The Genuine Walworth Stillson Wrench is standardized and all parts are fully interchangeable even over extended periods.

"5. Our local dealer carries a full line of Genuine Walworth Stillson Wrenches."



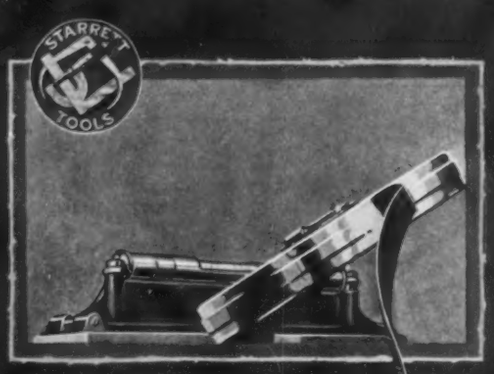
MFG. CO.

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Western Division:
Sales Office: Chicago, Ill. Works: Kewanee, Ill.

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Starrett Tools

Assurance of Accuracy

Perfect confidence in the accuracy of a rule, tape or level is vital. Such assurance comes through the name Starrett and the knowledge that every tool bearing that name is warranted.

A wide variety of styles and sizes of tools are described in Catalog No. 21AA, which is sent free on request.

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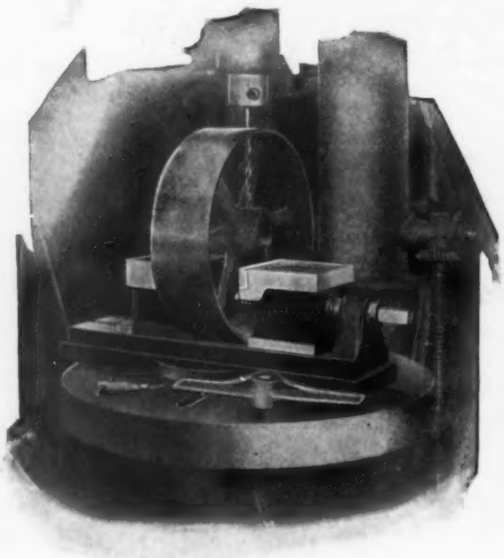
The World's Greatest Toolmakers

ATHOL, MASS.

New York London Chicago

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QUICKLY SET UP TO HOLD ANY SHAPED WORK

No hunting for clamps, bolts, washers, parallel strips, surface gages, to rig up a job. The UTILITY TIME-SAVING VISE does away with these attachments. It grips any shaped work instantly and accurately.

Used by hundreds of the biggest machine shops on all sorts of drilling jobs.

Send for complete details.

BROWN ENGINEERING CO., Reading, Penn.

The Highest Award

at the Panama-Pacific International Exposition, the gold medal for vises, has been awarded to

Reed Vises

This is merely expressive of what has long been fact in the opinion of Reed users. They know that whether competing under the scrutiny of official judges or whether the test is under the trying conditions of heavy shop usage, the Reed always wins. Write for catalog.



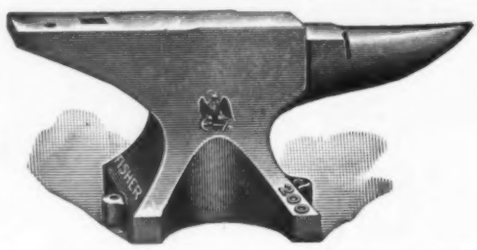
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THE "EAGLE" ANVIL

That has made Trenton, N. J., Famous

ANVILS



VISES

1843 **FISHER & NORRIS** 1918

"Eagle" Anvil Works Trenton, N. J.



Insurance! Free! "Vulcan" Safety





The old-time projecting set screw has always been a menace to your working comfort and physical safety.

Here we have the logical method of elimination:

1. A "Vulcan" drop-forging designed to clear all clothing-contact and give you complete tool-balance as well.

2. A "HOLLOW SET SCREW" of dimensions and material to warrant extreme strength and utility—danger from the old square head screw perfectly overcome.

3. A SPECIAL STEEL WRENCH which may in emergency be replaced by standard sizes of square material adapted for lever purposes.

"VULCAN" SAFETY is the "last word" in LATHE DOGS!





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"The Drop-Forging People"

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Thor

Universal Electric Drills

(Licensed Under Burke Universal Motor Patent)



Only portable electric drills made equipped with ball and roller bearings, insuring ease of operation and increased power. For direct or alternating 110 or 220 volts.

Independent Pneumatic Tool Company

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DRILLS

An original line of portable electric drills, grinders, etc., built for accurate and fast work.

Satisfaction given and time saved wherever they can be applied.

Each tool fully guaranteed.

Send for Catalog 4. It will interest you.

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OLDHAM CHIPPING HAMMERS

are efficient and durable.

We also make a complete line of

Foundry Rammers, Core Busters, Riveters

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FRANKFORD, PHILA., PENNA.

THREADING AND CUTTING



with a "Saunders" is highly economical. This machine has a range from 1 to 6 inches, and is quite complete in all its details. Both power and hand.

Catalogue "A" gives details

D. SAUNDERS' SONS
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Flexible Slag Gun, Digs Slag and Concrete
Flexible Rivet Cutting Gun, Cuts Rivets

The Slag gun is used in large Steel Mills because it digs slag in half the time required by other methods. The Rivet gun cuts and backs out 4,000 rivets in 9 hours. Let us send catalogs.

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Landis Machine Company, Inc.
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Manufacturers of

BOLT and PIPE Threading Machinery



Let our Engineering Department solve your threading problems—send your specifications today.

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Quality Portable Electric Drills and Grinders

Write for catalog and list of users. All tools are guaranteed. Ball Bearings are used throughout.

UNIVERSAL DRILLS AND GRINDERS

Operate on both A. C. and D. C.

THE STANDARD ELECTRIC TOOL CO. Cincinnati, Ohio

Hand or Breast Drills, 12 Sizes, sizes fitted with ¼ to 2½ in. cap. Ball bearing throughout. Larger screw feed.



Best by Test

We make complete line of Portable Electric **Drills** and **Grinders** for all purposes. Especially built to withstand hard usage. For all currents and voltages.

Catalog?

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New York Office: 50 Church Street

PIPE THREADING and CUTTING MACHINERY

Hand or Power

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QuiKwerk TOOLS

Railroad and Contractors'

The Warren Tool & Forge Co., Warren, O.

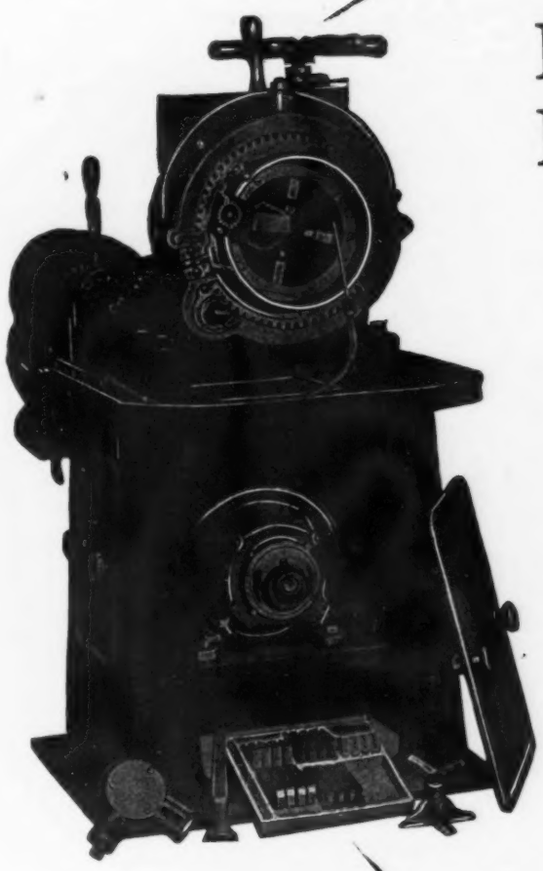


Model A
Write for Catalog

WONDER PIPE BENDERS
5 MODELS

BEND all sizes of standard or double thick steel, wrought iron, brass and copper pipe from ⅛" to 6". Used by United States, French and British Governments.

American Pipe Bending Machine Co.
Manufacturers
101 Pearl Street, BOSTON, MASS., U. S. A.



Logical Reasons for Forbes Supremacy

For over 35 years the Forbes Pipe Cutting and Threading Machines have proven superior to all other machines on the market. Their supremacy is shown in every comparison.

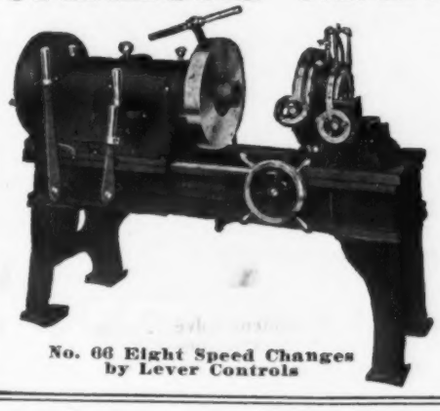
Costs less
Takes less labor
Does more work
Does better work
Consumes less power
Requires less floor space

These facts account for the accelerating demand for Forbes Machines.
Over 25,000 now in daily operation, every one giving perfect satisfaction.
Compare first—then you will buy a Forbes.
Catalog sent on request.

CURTIS & CURTIS CO.
98 Garden Street
BRIDGEPORT, CONN., U. S. A.

JARECKI MANUFACTURING COMPANY

ERIE PENNSYLVANIA



No. 66 Eight Speed Changes by Lever Controls

MANUFACTURER OF

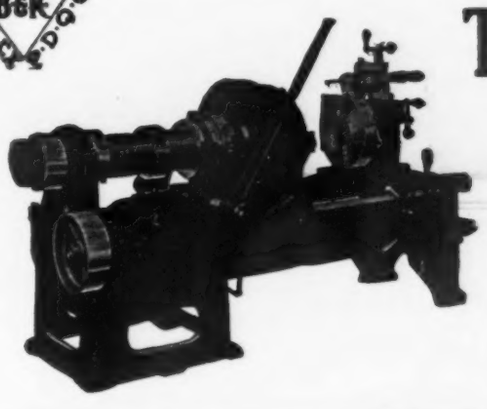
PIPE THREADING TOOLS FOR HAND, BELT, ENGINE OR MOTOR POWER. GOVERNORS AND UNLOADERS FOR ENGINES, COMPRESSORS AND PUMPS. MALLEABLE AND CAST IRON FITTINGS. BRASS AND IRON BODY VALVES AND COCKS.

CATALOGUES ON APPLICATION



Erie Unloader

PEERLESS B&K DUPLEX D.D.C.



Threading Costs

PEERLESS B&K DUPLEX D.D.C.

The cost of cutting pipe threads is largely a matter of efficient handling. In these machines production is increased by every practical convenience experience has enabled us to perfect.

The Peerless die adjusting mechanism—the cut-off and reaming device—the gear box, all make for rapid handling of the work.

BIGNALL & KEELER MACHINE WORKS
EDWARDSVILLE, ILL.



The Nilson Tilting Wire Reel in vertical position.

Foot-trip at base releases wire-carrying section to allow it to be lowered. Upright lever is pulled to release lock after coil is adjusted.

You Can Make Light of Heavy Lifting with the NILSON Tilting Wire Reel

Don't waste time, risk toes and lose temper loading wire reels in the old laborious way by lifting the heavy coil—let the reel do the work. The Nilson Tilting Wire Reel is the most efficient and easiest operated wire reel made. The wire-carrying section lowers to allow the coil to be shoved upon the prongs, then with little effort it is returned to the vertical position, a counterbalancing weight relieving the operator from heavy lifting.

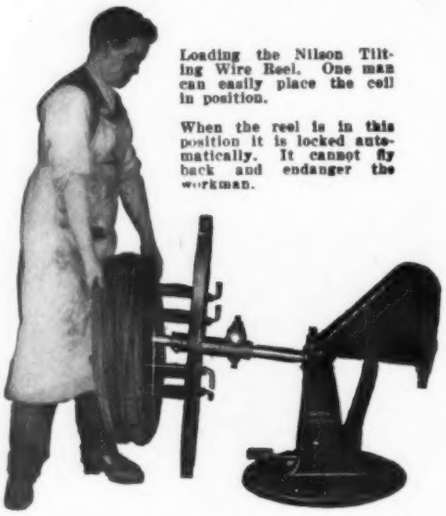
The reel automatically locks in both positions. A foot trip releases it to be lowered and a lever unlocks it when the coil is in position.

The reel can be adjusted horizontally for feeding flat wire.

One man can do the loading.

Increase the output of your wire-forming machines, decrease the cost of loading, and eliminate the danger of accident by installing the NILSON TILTING WIRE REEL at once.

Send for booklet giving illustrations and descriptions.



Loading the Nilson Tilting Wire Reel. One man can easily place the coil in position.

When the reel is in this position it is locked automatically. It cannot fly back and endanger the workman.

The A. H. Nilson Machine Company Bridgeport, Conn.



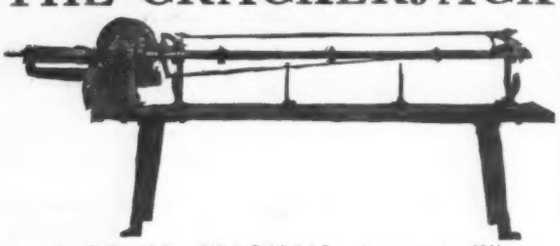
Sleeper & Hartley, Inc., Worcester, Mass.

WIRE, SPRING COILING MACHINES

We offer to the PROFESSIONAL SPRING MAKER more than FORTY STANDARD SPRING-MAKING MACHINES, for the production of wire spring forms such as are shown in the advertising section devoted to springs

The Machines That Put the "Rings" in Springs!

THE CRACKERJACK



A SIMPLE, PRACTICAL, Automatic Wire Straightener and Cutter.

Takes the wire from the coil, makes it perfectly straight and cuts accurate lengths.

Will pay for itself in a month.

Booklet "C" tells all about it.

THE FRANKLIN MFG. CO., New Haven, Conn.

Time and Money are Saved by Using

The DAYTON SWAGING MACHINE

In tapering tubes or shells, or in pointing rods for drawing you can always be sure of perfect work. Our book "The Modern Art of Swaging" will interest you. Yours for the asking.

THE TORRINGTON COMPANY

Successor to Excelsior Needle Company

TORRINGTON, CONN, U. S. A.

Coventry Swaging Co., Ltd., White Friars Lane, Coventry, England, Agents for Great Britain. Fenwick Freres & Co., 8 Rue de Rocroy, Paris, France, Agents for France, Italy, Belgium, Spain, Portugal and Switzerland.



Sleeper & Hartley, Inc., Worcester, Mass.

WIRE NAIL MACHINES

Smoothly running machines with balanced mechanical motions and no rotating cams. Practically noiseless in operation. Built in 5 sizes—handling wire from No. 18 to 3/8" diam.

Make Nails!—Not Noise!!



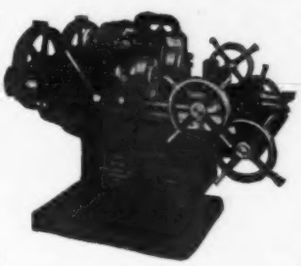
Wire Stranding and Closing Machines
(Larmuth Patent)

A high grade machine developed from long experience to meet the most exacting requirements. Ball bearings throughout. Full line of wire stranding and closing machines. Write us regarding your stranding problems.

THE NEW ENGLAND MACHINERY CO. - - - New Haven, Conn.

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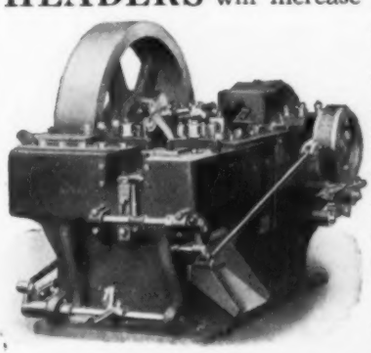
Write to us for anything you want in this line



The Acme Machinery Company, Cleveland, Ohio, U. S. A.
Cor. St. Clair and Hamilton Sts.

EUROPEAN AGENTS:
Burton, Griffiths & Co., London, England. Glanzer & Perreaud, Paris, France. Societa Italiana Macchine Utensile, Milan, Italy. Henry W. Peabody & Co., Melbourne, Australia.

NATIONAL "WEDGE GRIP" HEADERS will increase your output of bolts, rivets and upsets 15 - 25%



Dies last 3 to 5 times longer, and the output is of superior quality. Built in ⅝ to 2½ in. sizes.
Let us supply details.

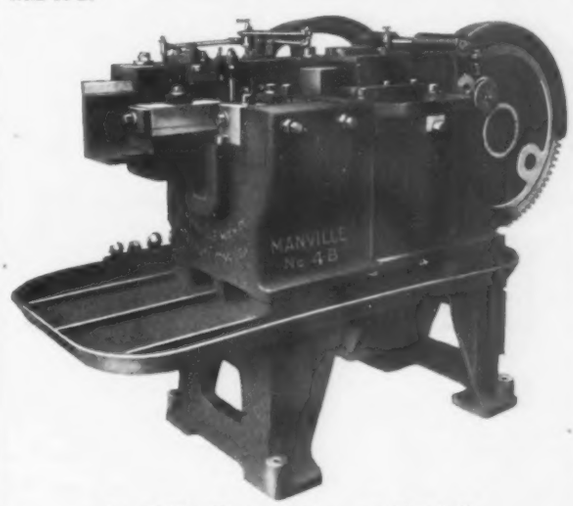
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Bolt Nut and Forging Machinery

MANVILLE

Direct Drive Reciprocating Screw Thread Rolling Machinery for Rapidly Producing Rolled Threads on Wire or Screw Blanks

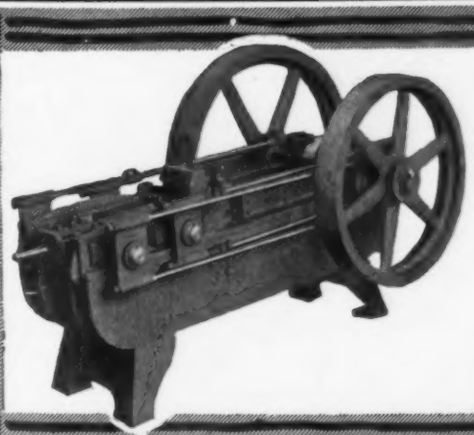
Our new design B Model Thread Rollers possess maximum power and rigidity. They are accessible and convenient to operate and will give high production on all classes of work. Write for bulletin 18-B.



No. 4B Manville ½ Machine or ⅝ Plow Bolt

E. J. MANVILLE MACHINE COMPANY
Waterbury, Conn., U. S. A.

Builders of Cold Headers, Thread Rollers, Bolt Trimmers, Screw Slotters, Bolt Cutters, Cold Pressed Nut Machines, Wood Screw Machinery, Power Presses, Wire Forming and Special Automatic Machinery.



Hot Pressed Nut Machines

Big Production
with small upkeep, no repair bills.

Heavy Construction
and in use by largest nut manufacturers in the country.

Howard Iron Works
287 Chicago Street Buffalo, N. Y.

HIGH CLASS RIVETED WORK



with very low production costs is secured by the use of our

"Elastic Rotary"
(Trade Mark)

Blow Riveting Machines.

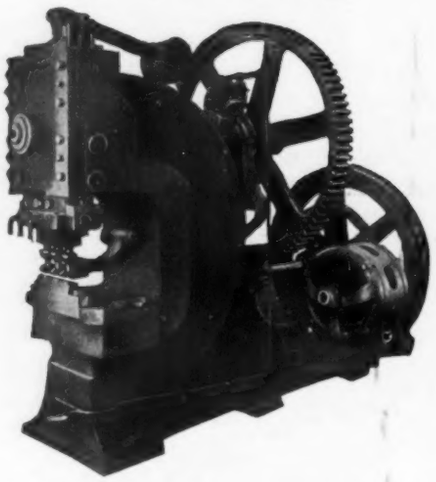
They make a tight joint, or a loose one, as desired, and every head is perfectly finished.

Operated by a boy or girl at small cost, and pay for themselves in a very few weeks.

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THE F. B. SHUSTER CO., New Haven, Conn.
Formerly John Adt & Son Established 1866
Also makers of Wire Straighteners and Cutters, Sprue Cutters, etc.

An Aid In Fast Shipbuilding



You cannot build ships too fast for Uncle Sam. Every time-saving and labor-saving machine should be put to use.

Beatty Power Punches

are built for speed. They are speeding up production in Shipyards, Structural Steel Shops, Car and Implement Manufacturers. The same is true of Beatty Shears.

Let us solve your punching problems.

BEATTY MACHINE & MFG. CO.
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HANNA RIVETERS



For All Classes of Work

Write or wire

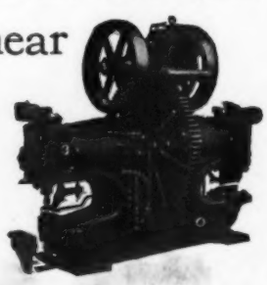
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SALES AGENT FOR
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ROYERSFORD

Punch and Shear

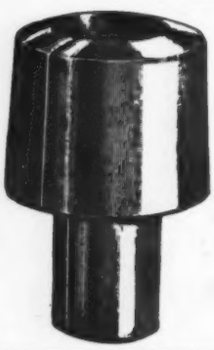


Direct motor or belt drive; 26″ throats; Shearing capacity 8″ x 1″ flat, 2″ round; will punch up to 1½″ through 1″ (with tie rods).

Write for complete specifications.

Royersford Foundry & Machine Co., Inc.
ROYERSFORD, PA., U. S. A.

Hot Rivets Do Not Affect the Temper



of our "Heatproof" Compression Riveter Dies. You don't have to stop work and cool them off like most dies.

When worn, they can be recupped without annealing —no retempering necessary.

Send for full details.

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1422 South Rockwell Street
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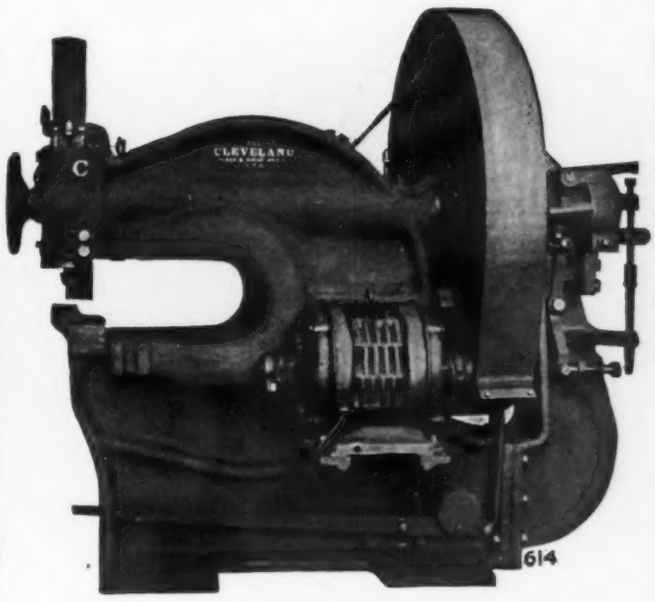
PUNCHES · SHEARS · BENDING ROLLS · PLATE PLANERS

FOR EVERY PURPOSE

See Photographs in

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Oct. 4th Issue—Plate Shear
Sept. 20th Issue—Punches and Shears for Structural Work
Sept. 6th Issue—Plate Planer
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Aug. 2nd Issue—Plate Shear
July 19th Issue—Punches and Shears for Structural Work
July 5th Issue—Plate Planer
June 21st Issue — Horizontal Punch
June 7th Issue—Plate Shear
May 17th Issue—Punches and Shears for Structural Work
May 3d Issue—Plate Shear
April 19th Issue—Plate Shear
April 5th Issue—Plate Issue
Mar. 15th Issue—Plate Planer
Mar. 1st Issue — Horizontal Punch
Feb. 15th Issue — Punches and Shears for Structural Work
Jan. 18th Issue—Plate Planer

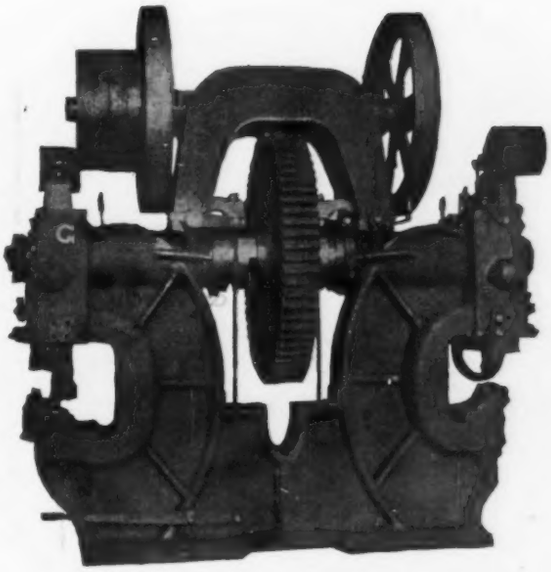
Send for Bulletin No. 11 showing our line of tools.
COVINGTON MACHINE CO., 14 Wall St., New York
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LET CLEVELANDS INCREASE YOUR PROFITS

That's what they are doing for the largest structural steel shops, boiler makers and shipbuilders.

Cleveland Punches are replacing inefficient equipment in plants where there is no desire to merely "get along", but where the aim is for larger and larger output.

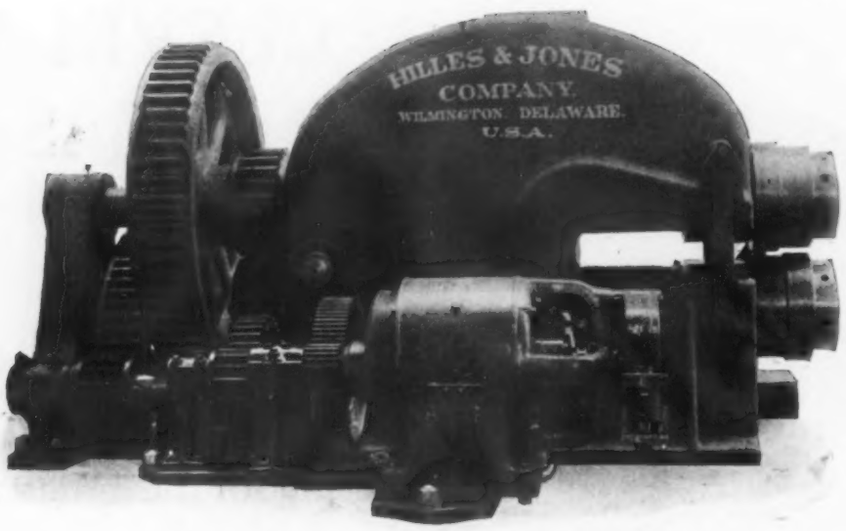


Cleveland Punches have characteristic features that enable you to speed up work, to meet the big demand in modern intensive production.

Our bulletins give you the information on types of Cleveland Punches and Shears for various plants. Send for copies.

Eventually You'll Buy Clevelands.

CLEVELAND PUNCH & SHEAR WORKS CO.
MAIN OFFICE & WORKS: CLEVELAND, OHIO
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SHIPBUILDERS

Get This Plate Joggling Machine

You can use it to great advantage in your busy shipyard. It will joggle ¾-in. steel plates 42 in. from the edge, or 1-in. thick plate with tie bolts in position 12 in. from the edge. The plate being cold, at one pass, is joggled at a rate of 10 ft. per minute. The housing is constructed massively and is reinforced by two heavy forged-steel tie links which can be removed when desired. Joggling rolls are made from forged steel in two pieces.

Let us send you our catalog describing the many machines we manufacture for saving time and enabling greater production. Write today.

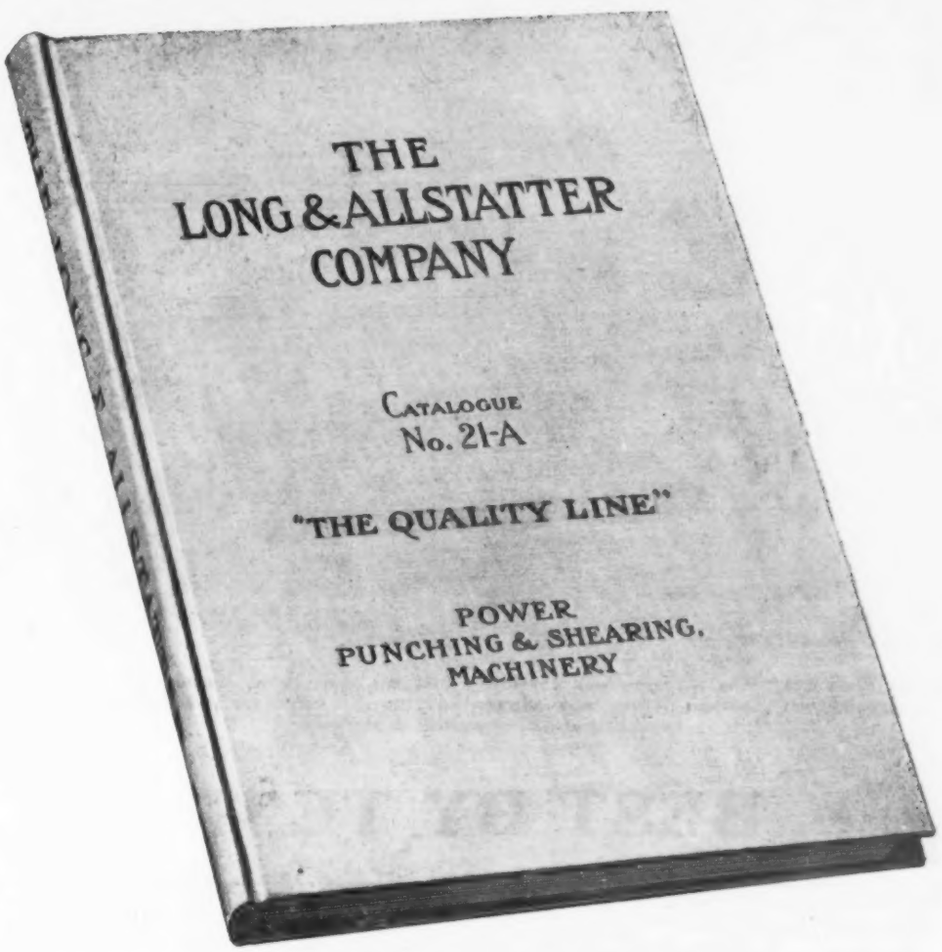
HILLES & JONES COMPANY
Church St. and Penn. Railroad, Wilmington, Delaware, U. S. A.

Branch Offices:
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Established 1856 *Incorporated 1878*

"The Quality Line"

Punching, Shearing and Forging Machines and Machinery Equipment for Shipyards, Steel Car Plants, Rolling Mills, Bridge and Structural Iron Works



OUR NEW CATALOG is 7"x10" and contains 304 pages. It illustrates and describes 267 machines, including Power Punches—Single—Double—Vertical—and Horizontal, also Multiple Punches for any number of holes. Power Shears for Bars—Plates—Beams—Angles—Channels and Special Shapes, also Angle Shears—Splitting Shears and Alligator Shears. It also shows Bending and Forming Machines—Riveting and Punching Machines—Automatic Spacing Machines and Special Machinery for Special Work.

The Electric Gag Control and the Floating Punch are shown and described as applied to Punching Machinery. Engineering data with tables of useful information are given which are of great value to the iron worker.

This is the most complete and the most interesting catalog ever issued covering this class of machinery.

Every manufacturer of iron and steel and its products where our line of machinery is used should have this catalog. The Purchasing Agent needs it and the Superintendent wants it—"SEND FOR IT."

THE LONG & ALLSTATTER COMPANY

HAMILTON, OHIO U. S. A.

New Scarphing Machine

(PATENT DEC. 11, 1917)



This Portable Plate Scarphing Machine was developed and has been in successful daily operation in our own yards for eighteen months. It has been adopted by a number of progressive shipyards in this country and England to speed up shipbuilding.

BEST BY TEST

This new invention

Will cut a smooth, accurate scarph in 10 MINUTES.

Is portable, handled over plate by jib crane and trolley, reducing operations to minimum.

Is light in weight, speedily operated by electric motor.

Will cut, at any angle, a scarph of any length up to 16″ and any width up to 8″.

Is readily adjustable for any thickness of plate.

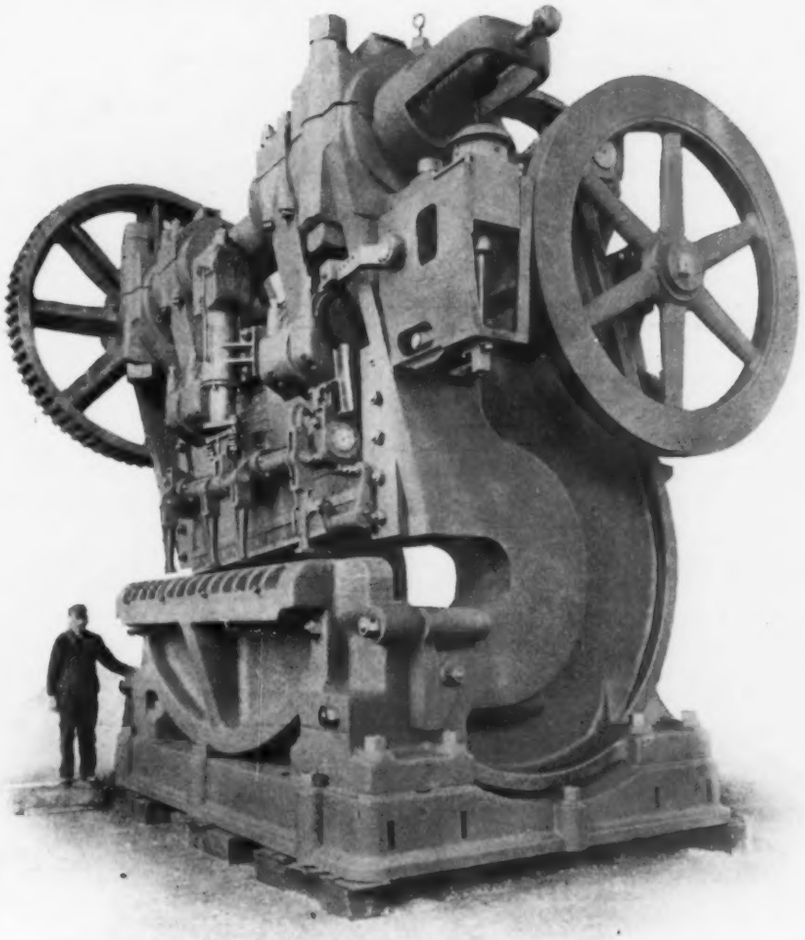
PROMPT DELIVERIES ON ANY NUMBER OF THESE MACHINES.

WIRE OR WRITE FOR PRICES

Skinner & Eddy Corporation

Seattle, U. S. A.

"UNITED" PLATE SHEARS



We build a great variety of Plate Shears ranging in capacity from ¼" to 2" in thickness and up to 192" in width. They are all arranged for motor drive and when necessary we attach our patented hold-down which securely holds the plates in position while being cut. A good shearing equipment is one of the most essential parts of a plate mill installation.

UNITED ENGINEERING & FOUNDRY CO.

PITTSBURGH, PA., U. S. A.

The World's Greatest Manufacturers of Rolls and Rolling Mill Machinery

Flanged Pipe.

Castings up to 130,000 pounds—made and machined.

Cast iron rams up to 35 feet long.

Hydraulic tools for boiler and plate shops.

Punches — Shears — Riveters — Accumulators—Pumps—Flanging Presses. Hydraulic Cranes—Keel Benders—Manhole Punches.

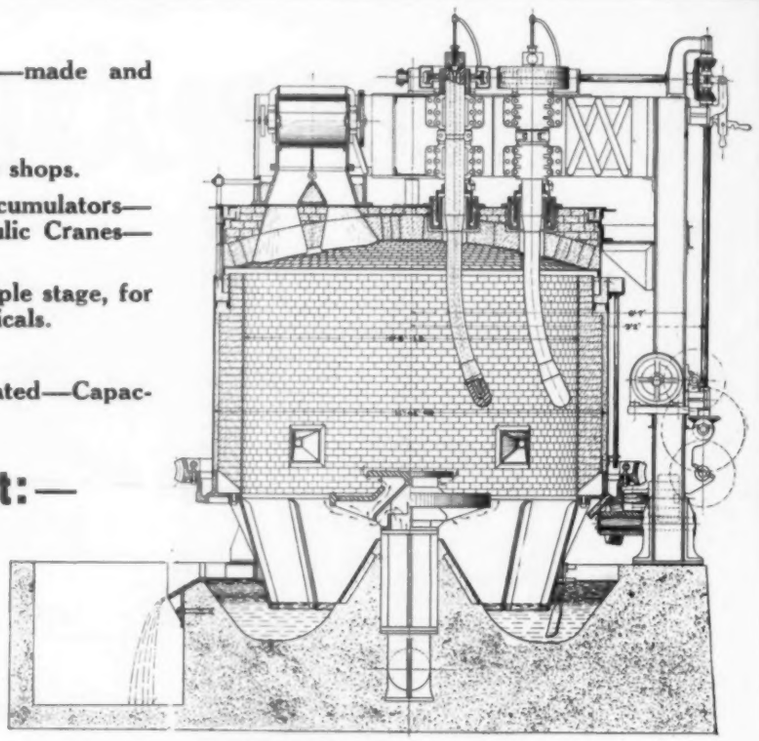
Centrifugal Pumps, single and multiple stage, for clear water, drainage, sewage, chemicals.

Gas Holders, Purifiers, etc.

Gas Producers—Mechanically operated—Capacity 40 tons per day and upward.

A Gas Producer That:—

Feeds the coal mechanically,
Removes the ash mechanically,
Stirs the fuel continuously,
Gasifies 50 tons of coal per day,
Has highest thermal efficiency,
Has greatest operating economy,
Produces the best gas, and
Uses the poorest coal.



Section of Heavy Duty Producer

Camden Iron Works, Camden, N. J.

Engineers—Iron Founders—Machinists

Heulings Lippincott, Alfred J. Major, Receivers.

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Shipyard Machinery
Operating Valves
Universal Flanging Presses
Twin Punches and Shears
Horizontal Bending Rolls
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Accumulators
Riveters
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QUICKWORK ROTARY SHEARS for BRIDGE BUILDING

IN the short time that Quickwork Rotary Shears have been on the market they have practically revo lutionized cutting methods.

Quickwork Shears cut circles, serpentine, and the most irregular shapes—work which has heretofore had to be cut by blanking dies in a press.

Quickwork Shears increase cutting of regular and irregular shapes from 50% to 90% over any other known method.

Quickwork Shears are used and endorsed by the foremost manufacturers of structural work for bridges, buildings and every class of work requiring shears for cutting plate and sheet metal quickly and accurately.

We have a size and style to fit your needs. Write.

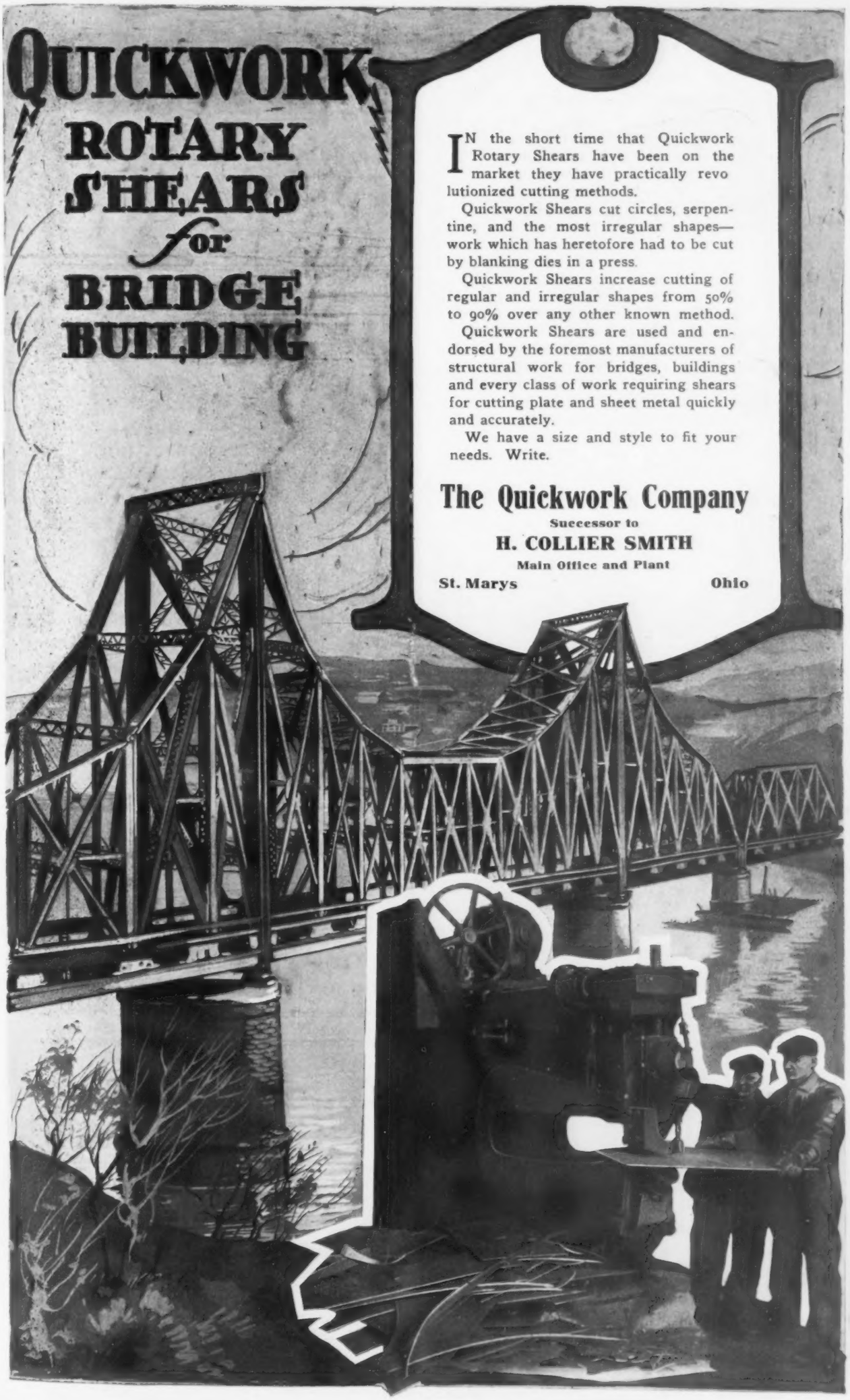
The Quickwork Company

Successor to

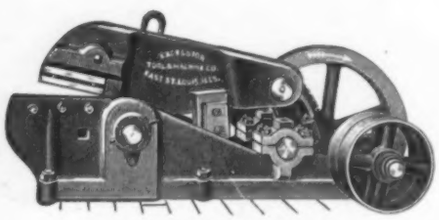
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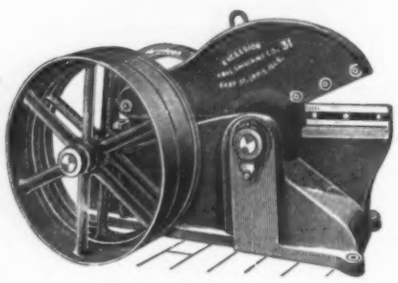
St. Marys Ohio



Excelsior Alligator Shears



1¾ inch capacity



1¼ inch capacity

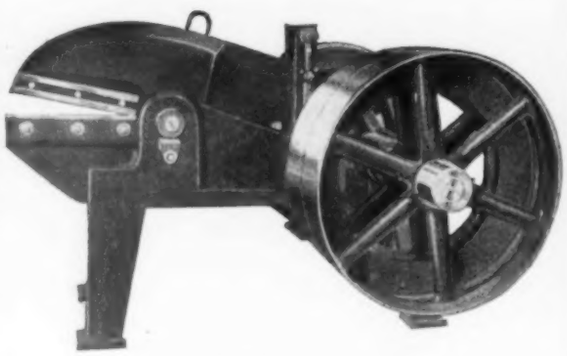
Manufacturers of Shearing, Punching, Grinding and Polishing Machines, Brick Presses and Briquette Machines. Prompt Delivery.

Excelsior Tool & Machine Co.
East St. Louis, Ill.

An Unskilled Laborer and a Cedar Rapids Alligator Shear

can make "Gold from the Scrapheap." The No. 3A illustrated has a cutting capacity of 1¼ inches. The knives are of finest tool steel with reversible cutting edges.

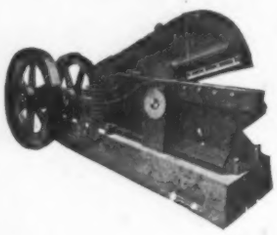
The above is only one of our types of shears. We make Alligator Shears for Shipbuilders, Structural Iron Workers, Railroads, Rubber Companies and for Industries where special shear equipment is required.



Cedar Rapids Foundry & Machine Co.
Cedar Rapids, Iowa

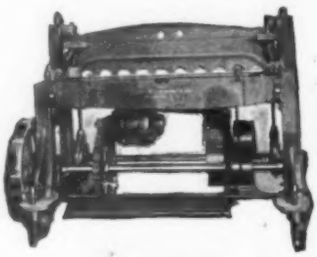
CANTON HIGH-KNIFE SHEAR

Furnished in either motor or independent drive. Most economical and efficient shear for cutting large quantities of Boiler Plate, Tank Stock, etc. Housings are low and out of the way, permitting plate to be pushed back as far as the gears.



All danger of twisting the crank or countershaft is eliminated by our double gearing feature. Canton Shears require less power than other shears to operate. Write for a copy of our Brown catalog.

CANTON FOUNDRY & MACHINE CO.
CANTON, OHIO

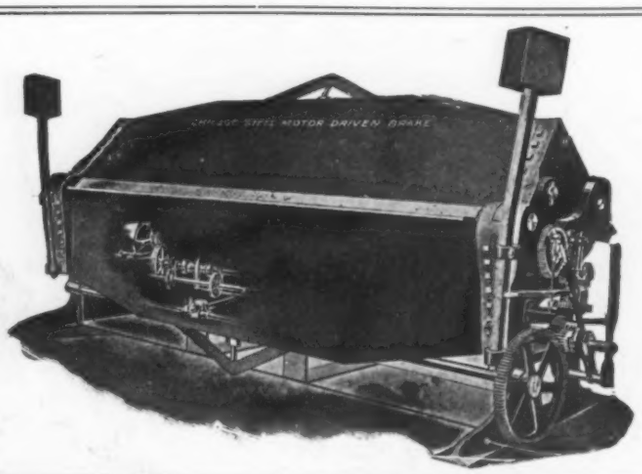


SHEET METAL MACHINERY

Portable Shear—

The convenience and efficiency of the shear illustrated above, mounted on casters and geared direct to motor, are self-evident. Do it the new way—roll the shear up to the steel pile instead of moving tons of sheets to a permanently located shear.
We specialize in improved metal working machinery.

Loy & Nawrath Co.
21 Runyon St. Newark, N. J.



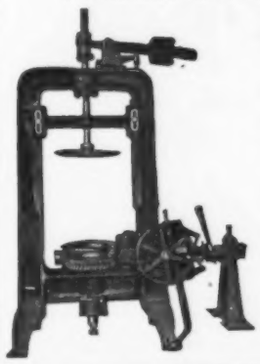
Chicago Steel Bending Brake

Illustration 12 ft. for ⅜ plate and lighter. Made in all sizes from 3 to 16 ft. to bend up to ½-inch plate cold.

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Round Double Seamers

of every size. The No. 9 Seamer shown here will flange and roll a true double seam on a full size 3-32-in. steel barrel.

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FOR ALL PURPOSES

THE PECK DROP PRESS WORKS · MINER & PECK MFG. COMPANY, PROPR'S · NEW HAVEN, CONN.

OUR SPECIALTY

THE PECK AUTOMATIC DROP LIFTER

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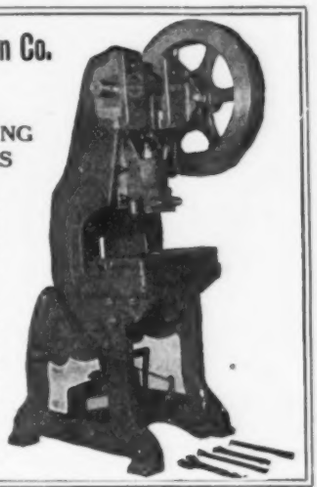
The Verdin Kappes & Verdin Co.

CINCINNATI, OHIO

Manufacturers of

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This cut illustrates our No. 2 Inclinable Punching Press. It is of latest design, embodying many new features which give strength, rigidity, simplicity and durability, longer service to dies and greater results from press.
Write for both prices and booklet containing full information.
A new positive clutch controls the working of press. It is simple and durable. Presses made in four sizes, viz.: 10, 20, 30 and 40-ton ram pressure. Dies are interchangeable from small to larger presses.

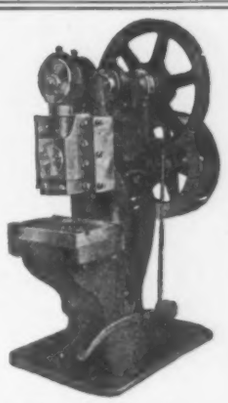


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Niagara Presses lead in intrinsic value, and are the most satisfactory investment offered. Experienced press users prefer them because they are properly designed, easy to operate and economical. Shafts are forged of carbon steel and ground to size. Don't be skeptical, but give us an opportunity, and we will make good.

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Niagara Machine & Tool Works
BUFFALO, N. Y. Mfrs. of Tools for Sheet Metals

"Poorman" SHEET METAL MACHINERY

Corrugators—Curving Rolls—Forming Presses

Manufactured by

The Streine Tool & Manufacturing Co.
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Presses, Dies, Sub-Presses

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We manufacture a complete line of sheet metal working machinery, including machines for the manufacture of hoops for steel barrels and auto rims, rotary shears, wiring and beading machines.

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Catalog?

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for accurate and economical stamping of every description. Their cost is small compared to the amount and quality of work they produce. Let us send our representative.

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Presses—all types.
Press Attachments—automatic.
Metal and Wire Forming Machines.
Tumblers—large line.
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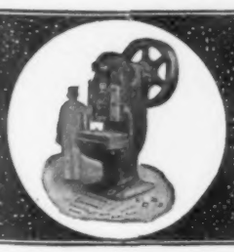
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Sheet Metal Working Machinery

THE V. & O. PRESS CO.
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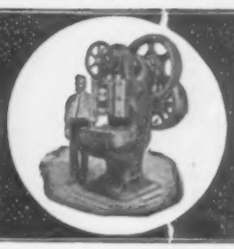


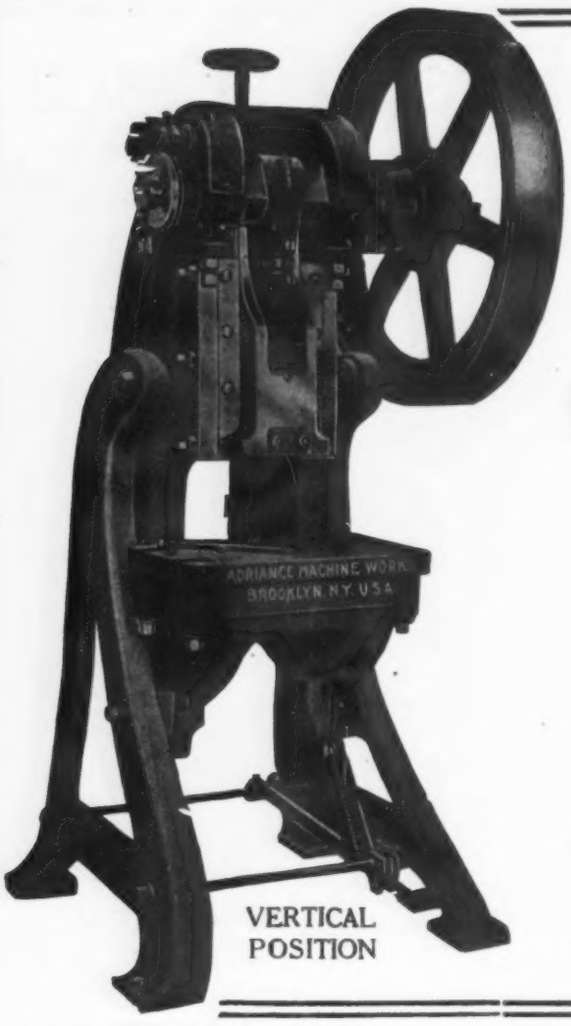
FERRACUTE PRESSES

HUNDREDS OF SIZES AND STYLES

FOR CUTTING AND FORMING SHEET METAL

FERRACUTE MACHINE CO., BRIDGETON, NEW JERSEY





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"ADRIANCE" Inclinable PRESSES

ORIGINAL IN DESIGN

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All Sizes in Stock For Immediate Shipment

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THE TOLEDO MACHINE & TOOL CO.
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PRESSES, DIES, SHEARS, DROP HAMMERS
SHEET METAL WORKING MACHINERY

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BLISS PRESS

with Roll Feed in the Bridgeport plant of the Conn. Electric Manufacturing Co. makes Brass Caps for fuse plugs so rapidly that a barrel or two can be had almost any time.

With two sets of dies and a speed of 80 strokes per minute, the output approximates **9,500 per hour** using strip brass .010 inch thick.

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A Powerful Spring Foot Press

"Some" Features
Absolute uniformity of blow. Every blow decisive. Force of blow variable. Does not tire operator. No jar or shock to foot. Powerful, rapid.

Especially Adapted
For straightening, bending, stamping, upsetting, riveting, piercing, etc.

Dimensions
Stroke of ram 2".
Max. dis. ram to bed 5¼".
Center of ram to column 2¾".
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Size of die bed 9½x5".
Floor space 21"x24".
Net weight 415 lbs.



The Taylor & Fenn Co.
HARTFORD, CONN.
Sensitive Drilling Machines Water Tool Grinders

Reg. U. S. Pat. Office

TEST PRESSES

For applying Internal Pressure Physical Test to Shells

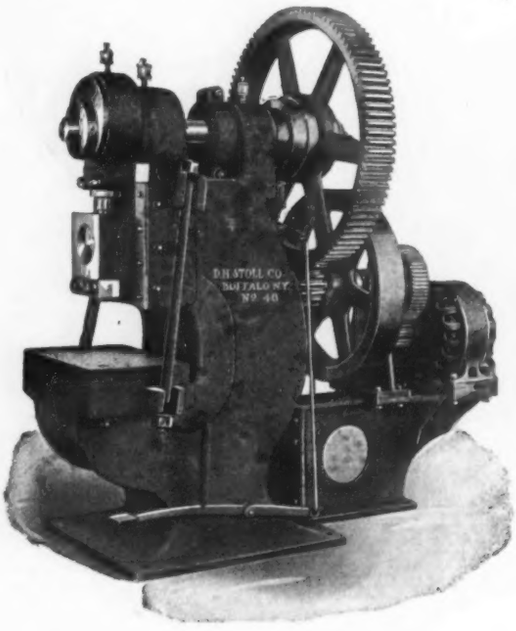
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For Pressing in Copper Rotating Bands on Shells

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Motor Driven or Belt Driven in all Sizes.

Also Squaring and Gap Shears.

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80,000 Lbs. Pressure

The Manhattan Screw Press is guaranteed to 80,000 lbs. pressure. The arrangement of the hand wheel is very convenient for the operator, enabling him to finish work quickly and accurately.

Send for full constructive details of this machine.

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For Sheet Metal Work
All sizes—All types. Up to 60,000 lbs. weight.
Established 1891
Henderson Machine Co.
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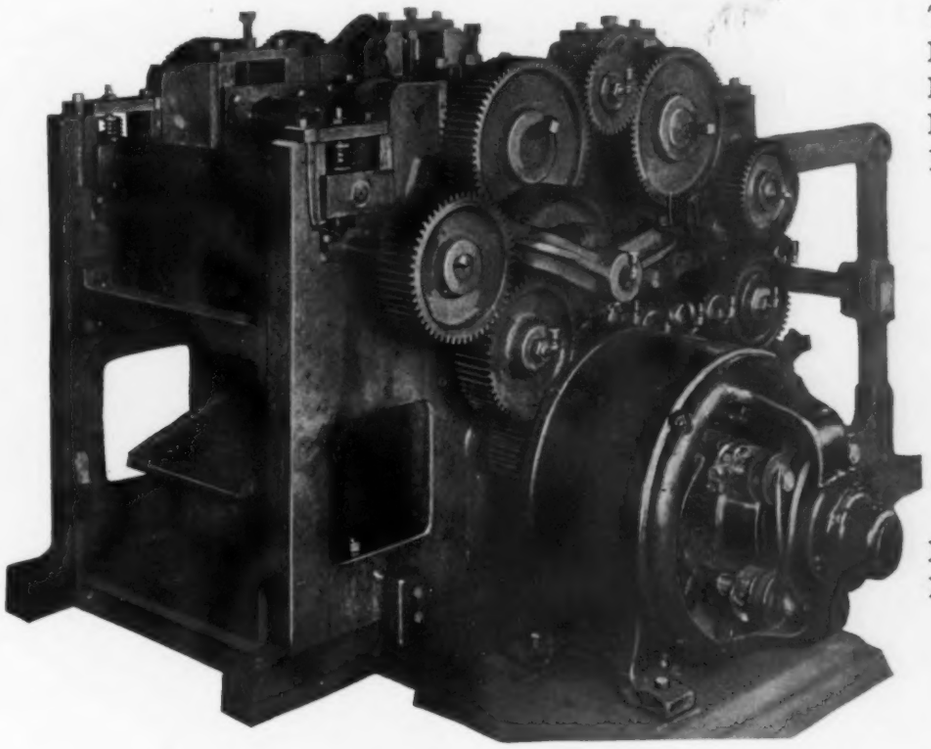


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IT SAVES Marring, Upsetting or Springing the Arbors. Cleaning out the centers and taking off the dogs, etc., etc.

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THIS IS THE RAPID PRODUCTION PRESS WE MAKE

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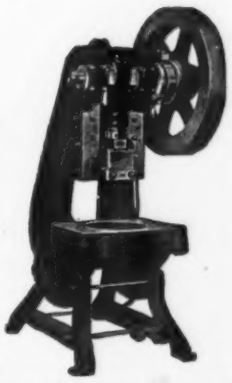
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UNSURPASSED FOR PRODUCTION

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Malm Engineering Company

PHILADELPHIA PENNSYLVANIA



Here's the Press

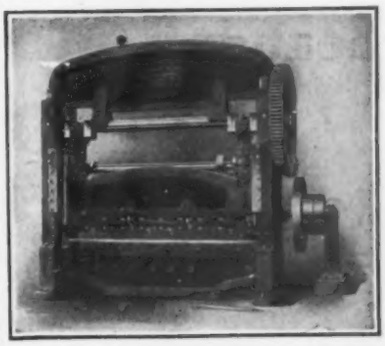
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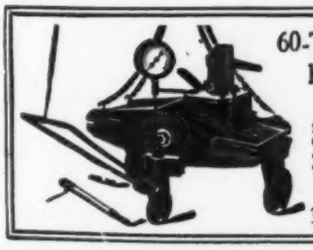
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The Pittsburgh Foundry, Est. 1803

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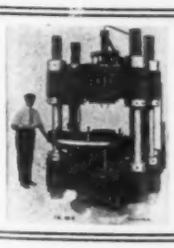
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NEW DESIGN

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Engineer-Builders of Hydraulic Machinery exclusively.

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Vertical Adjusting Crankpin Press. Standard patterns of presses from 10 to 600 tons. Vertical or Horizontal Forcing Presses, Bending, Straightening and Broaching Presses a specialty.

Material and Workmanship guaranteed.

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We are equipped to handle orders for hydraulic machinery in all its many branches—valves, pumps, accumulators, presses, benders, shears, shaft straighteners, etc. Our large line, over 4000 complete machines, probably offers a standard model that will meet your requirements. If not our 60 years' experience building hydraulic machinery is yours for the asking. Why not tell us your problem now?



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Bradley Upright Hammers

are made with heads weighing 15 to 500 pounds. Each contains ⅓ to ½ more material than those of any other make of the same rating.

Their anvil blocks weigh nearly or quite double those of other hammers.

Their output is guaranteed 25 per cent greater than is possible with other hammers of same rating, or no sale.

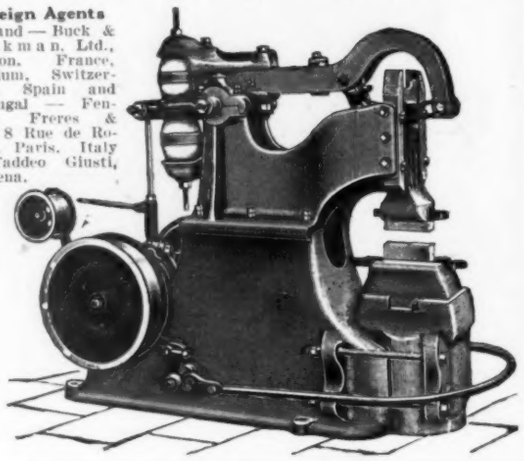
More Bradley Hammers are sold each year than of all other power hammers combined.

We make four styles of Belt Hammers and a line of Heating Forges.

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Forging presses, shears, fixed or portable riveters, punches and hoists. Accumulators, high duty pumping engines, steam and centrifugal pumps, GAS POWER PLANTS, PRODUCERS, CAST IRON PIPE, VALVES AND HYDRANTS.

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Beaudry Hammers

FOR

General Forging

Save Fuel, Time and Labor. Cut Forging Costs in Two.

Belt or Motor Driven

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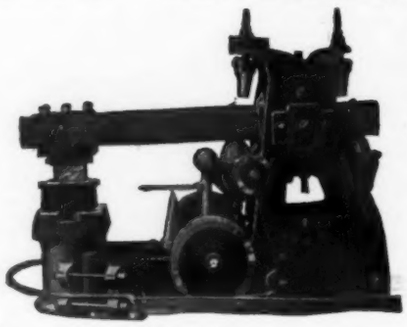
Single Frame, Double Frame and Steam Drop

HAMMERS

Presses, Punching and Shearing Machinery

The Massillon Foundry and Machine Co.
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Moline Helve Hammers



Extra Heavy Helve Hammers with easy, quick-acting control. Reliable and ready at all times.

This is one of a complete line of Power Hammers. Line also includes Justice Spring and Yeakley Vacuum hammers.

Our line includes complete Forge Shop equipment.

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Little Giant Power Hammers

Belt Driven *Motor Driven*





FIVE MODELS

25-lb. ram, 400 R. P. M. Will forge up to 2" rd. Floor space, 16"x27".
50-lb. ram, 350 R. P. M. Will forge up to 2½" rd. Floor space, 20"x39".
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Guaranteed forever against defective material and workmanship.

Durability combined with machine gun rapidity and precision, and entire absence of vibration.

All sales made subject to return at factory expense within 30 days after arrival of shipment if for any reason unsatisfactory to purchaser.

Special dies for any forging purpose. Prices quoted on receipt of drawings or sample of work to be done.

Operator carefully guarded against any chance of personal injury.

More than 6000 Little Giant Power Hammers are in daily use.

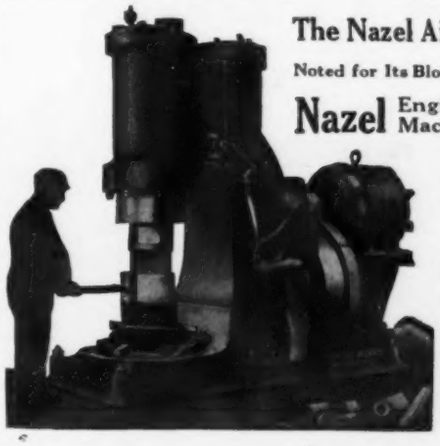
Our average annual repair sales for all Little Giant Power Hammers in use, from the first one sold 25 years ago to the latest, averages about 48 cents each, or less than two-fifths of one per cent of original cost of purchase.

We know of no Little Giant Power Hammer ever going to the scrap heap.

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Established A. D. 1876

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Noted for Its Blow and Control

Nazel Engineering and Machine Works

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More economical than steam, more powerful than springs, more efficient than either.

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Erie Double Frame Steam Hammers

Designed for heavy miscellaneous forging.

Operate equally as well with compressed air.

Write for detailed description.

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Erie, Pa.

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STEAM HAMMERS
"All sizes for every class of work"
HYDRAULIC MACHINERY
Chambersburg Engineering Co.
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PITTSBURGH FOUNDRY ESTABLISHED 1803
BINGHAM STREET PITTSBURGH.

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The TORRINGTON MFG. CO.
TORRINGTON, CONN., U.S.A.

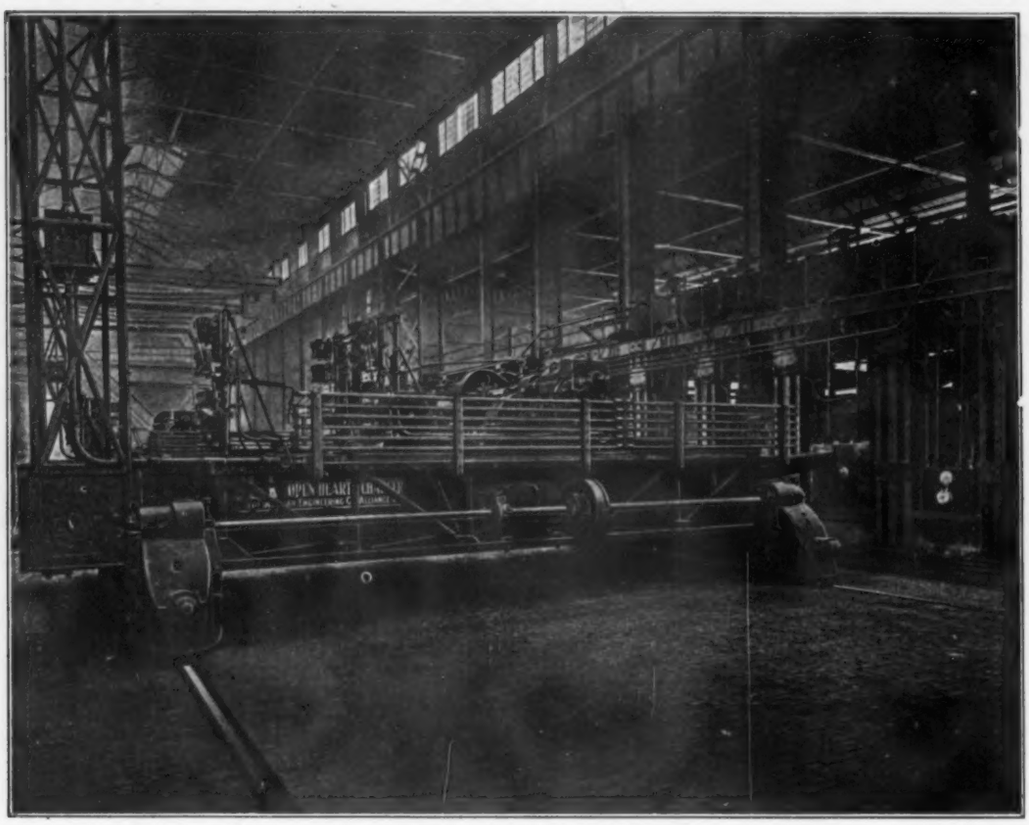


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Blocks and Rolling Mill Equipment of all kinds

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The managers of the big steel mills are the world's most discriminating buyers.

And Morgan for steel plants is nearly always specified.

This big Open Hearth Floor Charging Machine shown above is a typical example. Massive in design and rigid in construction, they are durable, accessible, and economical in upkeep and operation.

There are 131 Morgan Open Hearth Charging Machines operating in 57 steel plants.

Here is a record for service: Two of these machines charged over a million tons without replacing track wheels, gears or bushings.

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Heavy Forgings

of every description furnished on short notice

Gray Iron and Air Furnace Castings up to 100 tons

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Special Alloy and Acid Resisting Castings for special purposes

STEEL CASTINGS to meet any requirements

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The MORGAN ENGINEERING COMPANY
ESTABLISHED 1868
Alliance, Ohio. U.S.A.

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PETROGRAD
M. Mett & Co.

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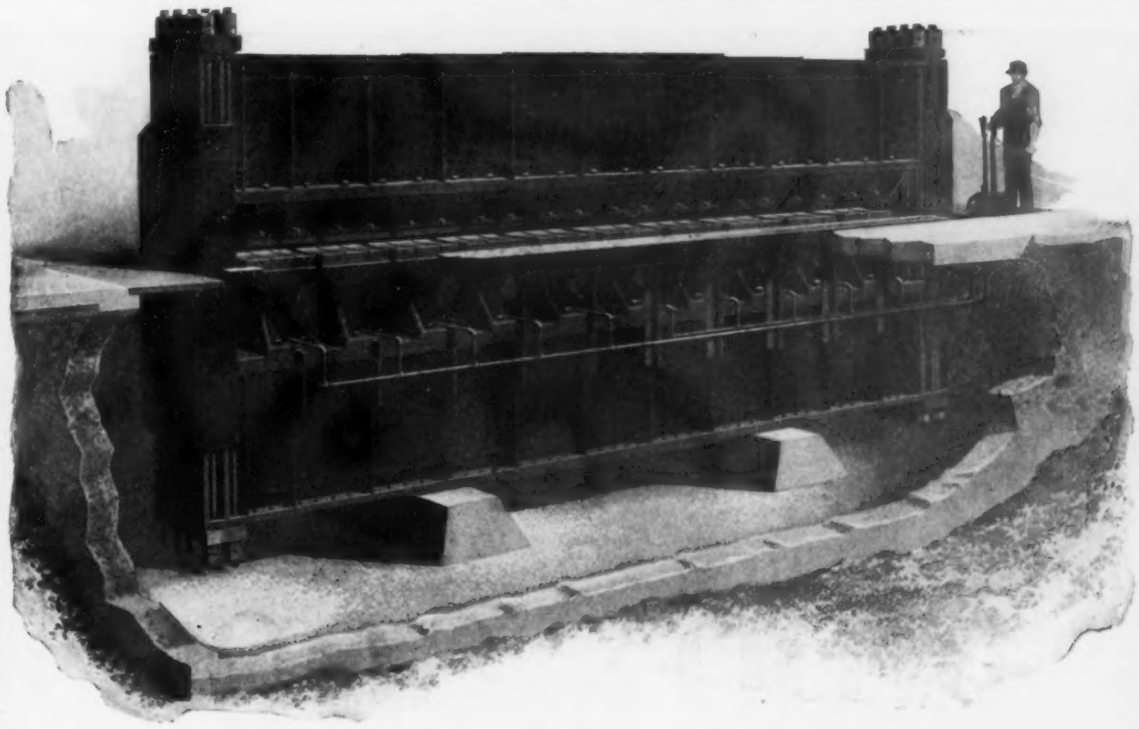


PLATE ROLLING PRESSES

(Hydraulic)

Performing on cold material all operations of

31 FOOT BENDING ROLLS

Also Flanging and Small Radius Bends, Angle Crimping, etc.

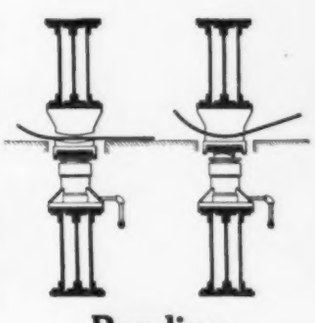
COST: Less than one-half that of bending rolls.

DELIVERY: About one-third the time.

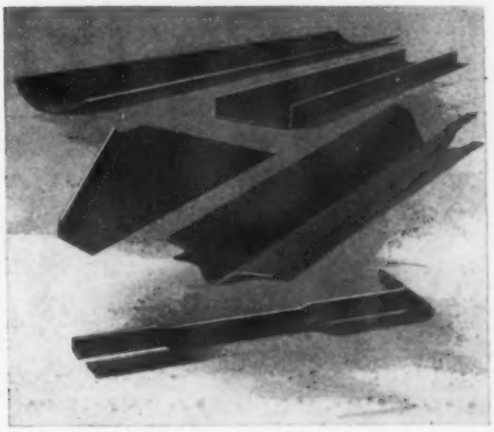
SIMPLE RAPID ECONOMICAL

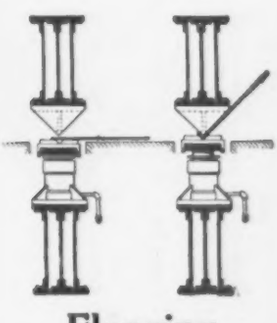
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BAILY & ALLEN CO., 126 S. Michigan Blvd. **CHICAGO, ILL.**



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MORGAN
REDUCING GEARS
HERRING-BONE TEETH

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In sizes from

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HORSE POWER

Designed to meet growing tendency toward the use of *High Speed* Electric Motors *for Rolling Mill Drives*

Built to meet severest Rolling Mill conditions
All parts easily accessible



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WORCESTER MASS. U.S.A.

MORGAN
WIRE DRAWING EQUIPMENT

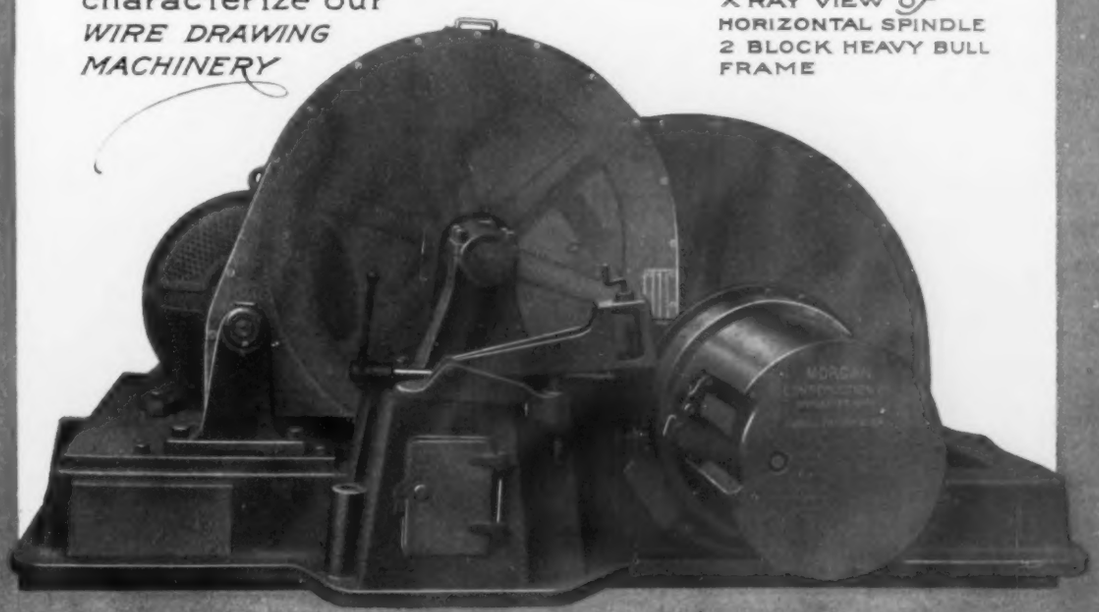
M C Co

FROM WIRE ROD
TO ALL SIZES OF
FINISHED WIRE
AND COLD DRAWN SECTIONS

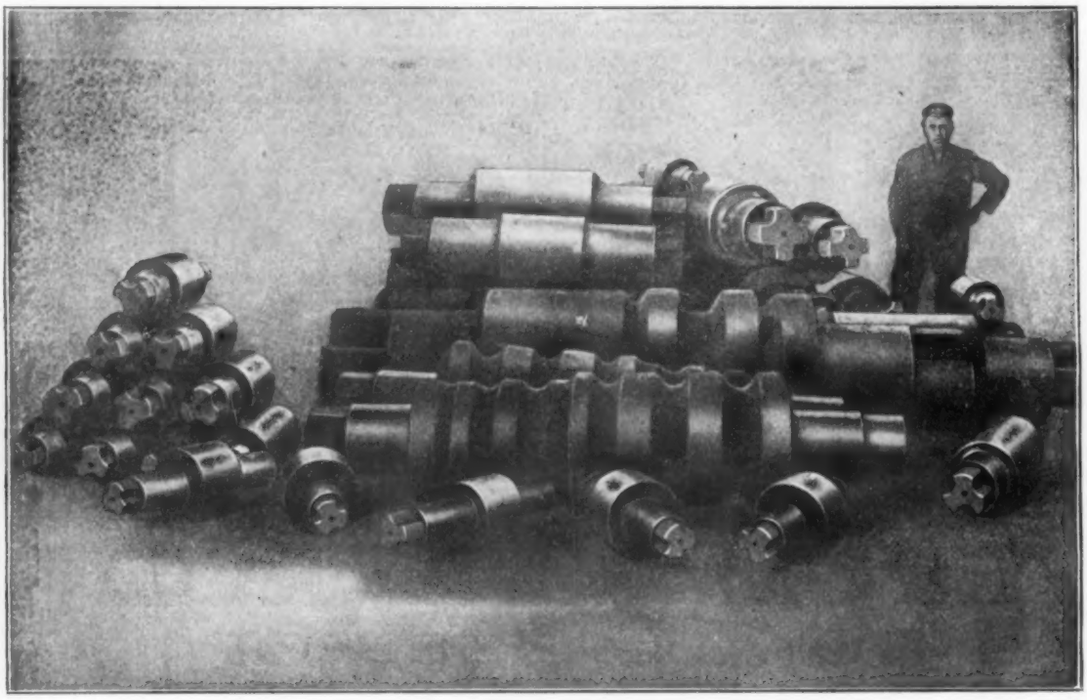
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Efficency of Operation
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characterize our
WIRE DRAWING MACHINERY

X RAY VIEW of HORIZONTAL SPINDLE 2 BLOCK HEAVY BULL FRAME



MORGAN CONSTRUCTION CO.
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Rolling Mill Machinery
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BIRDSBORO STEEL FDY. & MACH. CO. Birdsboro, Pa.

WHEELING MOLD & FOUNDRY CO.

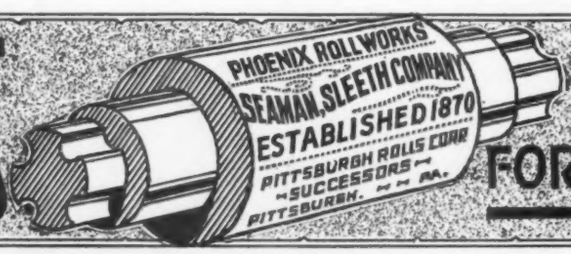
WHEELING, W. VA.

Rolling Mill Machinery
Steel Castings
Iron Castings
Special Machinery

High Grade
Prompt Delivery

Steel Rolls
Super-Steel Rolls
Chilled Rolls
Sand Rolls

ROLLS



EXCLUSIVELY FOR ALL PURPOSES

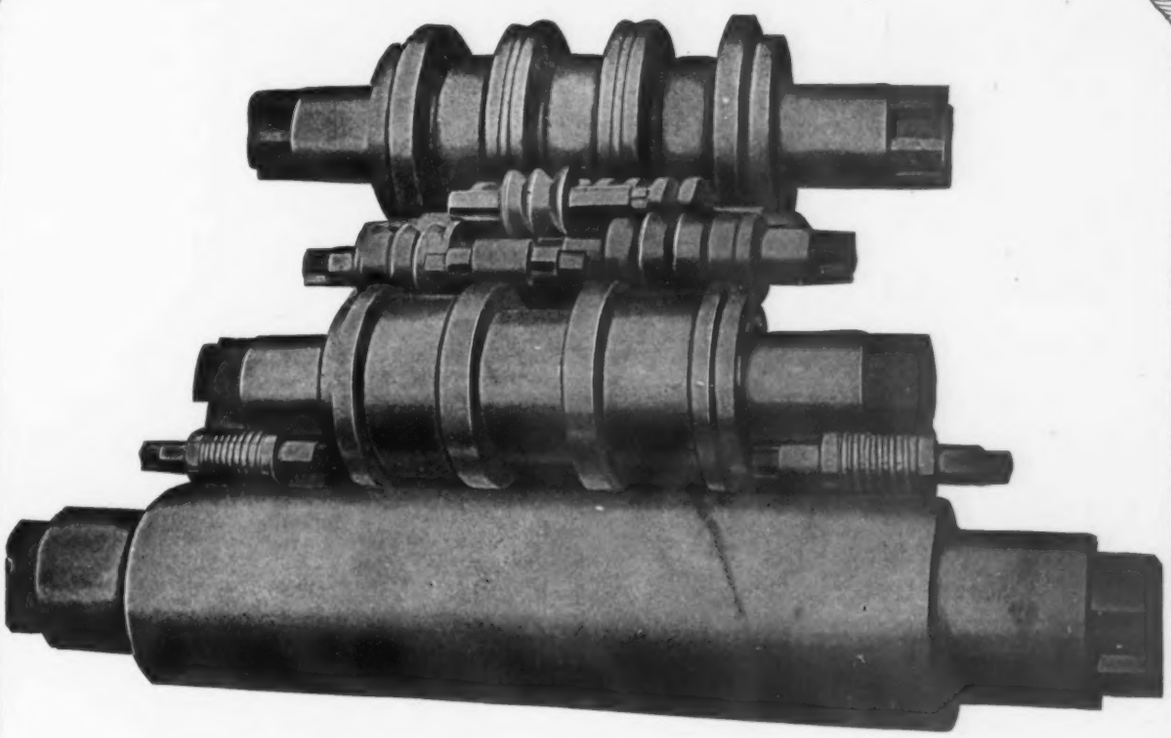
CHILLED ROLLS SAND
SPECIAL MACHINERY DESIGNED FOR YOUR REQUIREMENTS
YOUNGSTOWN FDRY & MCH. CO. Youngstown, Ohio

E. KEELER COMPANY
ESTABLISHED 1864
WILLIAMSPORT, PA.
WATER TUBE and RETURN TUBULAR BOILERS

MACKINTOSH HEMPHILL & CO

FORT PITT FOUNDRY

GENERAL OFFICES-1227 LIBERTY AVE
WORKS: 12TH & ETNA STS., PITTSBURGH, PA.



WE specialize on Rolls and Castings that require particular compositions and scientific heat treatment

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ROLLS

Lewis Foundry & Machine Co.

PITTSBURGH, PA., U. S. A.

WE CAN MAKE PROMPT DELIVERY

of

Chilled and Sand Rolls, Rolling Mill Equipment, Gear Drives, Roll Trains, Shears, Roll Lathes, Punches, Etc.

Consult Our Engineer If Planning Improvements

The Babcock & Wilcox Company

85 Liberty Street, New York

Water Tube
Steam Boilers

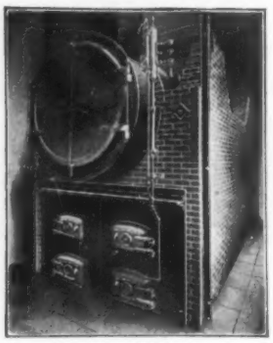
Steam Superheaters
Mechanical Stokers

Works:

Barberton, Ohio **Bayonne, N. J.**

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CINCINNATI, Traction Bldg.
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Save On Coal
Improved Design

Saves ¼ of coal over ordinary conditions. Burns bituminous coal smokelessly. Has great overload capacity without priming. Occupies less space.

Boilers 136-313 H.P. in stock.

Uniflow Boiler Co.

2 So. 15th St., Philadelphia, Pa.

ERIE CITY IRON WORKS

ERIE, PA., U. S. A.

Horizontal and Vertical Water Tube Boilers

Stationary Return Tubular Boilers

Economic Return Tubular Boilers

Steel Plate Construction

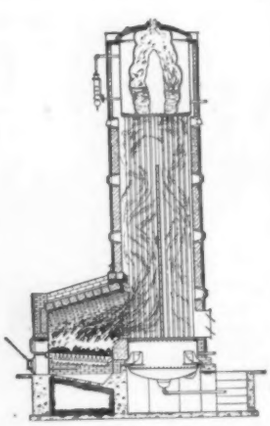


Dry Steam Pays

There is always some moisture in steam as it comes from the boiler, unless superheated, and sometimes even then. The removal of this moisture will increase the efficiency of the turbine about 1% for each per cent of moisture removed. Reciprocating engines will operate with less wear and friction, and 25 to 50% less cylinder oil when using dry steam than when using wet steam. A Cochrane Separator will protect steam turbines against erosion and wear due to water in the steam. It will also keep sludge brought over by priming of the boilers, or scale from the pipe lines out of the engine or turbine. For installation close to engine throttles to maintain a higher average pressure and equalize the flow through steam lines, damping vibrations and stopping slugs of water, as from priming of the boilers or condensation in the steam line, we recommend the Cochrane Receiver Separators, which will hold the mass of water until traps can drain it away. Full particulars on steam and oil separators, their design and uses, given in our new Catalog No. 550, sent upon request.

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No. Philadelphia Station 99B PHILADELPHIA, PENNA.



Wickes Vertical Water Tube Boiler

Ask us why engines are never wrecked and steam turbines never have eroded and clogged blades and nozzles when using this boiler.

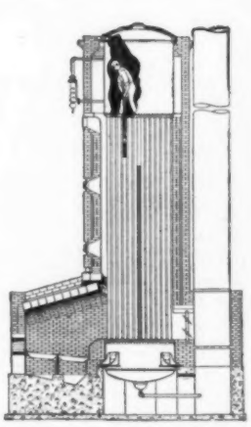
Ask for "Aids in the Selection of a Boiler"—sent free.

THE WICKES BOILER CO.

Saginaw, Mich., U. S. A.

SALES OFFICES:

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Boston, 201 Devonshire St.
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Add: Dearborn Treatment to Your Boiler Feed Water

Subtract: Scale — Corrosion — Pitting—Foaming

Result: More Power

As much power from a less amount of fuel. *More power* from every additional shovelful.

Dearborn Treatment is scientifically adjusted to suit individual needs shown by analysis. Send gallon sample of water.

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CHICAGO
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Laboratory and Factory, 1029-1037 W. 35th Street.

CENTRIFUGAL PUMPS

For Any Service—Any Head—Any Volume

FREDERICK PUMPS are the product of experience, designed and built along the most modern lines, incorporating all desirable features.

Guaranteed performance verified by actual operating tests before shipment.

Consult us regarding your requirements

THE FREDERICK IRON & STEEL CO.
FREDERICK, MD.

The Slogan of the Cameron—"Character: The Grandest Thing"

True Pump Economy

Cameron Pumps

When you buy a Cameron Pump you pay a little more to get a great deal more.

From the time you install a Cameron you start with lower upkeep and repair costs. In the end you pay less for the Cameron than if you had bought a cheap pump.

Few working parts and no outside valve gears with a construction throughout of great strength — these are some of the reasons that account for the economy you get out of a Cameron.



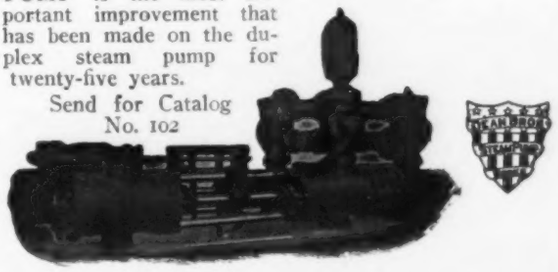
Full details in Bulletin No. 7204—it's free.

A. S. Cameron Steam Pump Works
11 Broadway, New York Offices the World Over
44-S

THE VALVE MOVEMENT

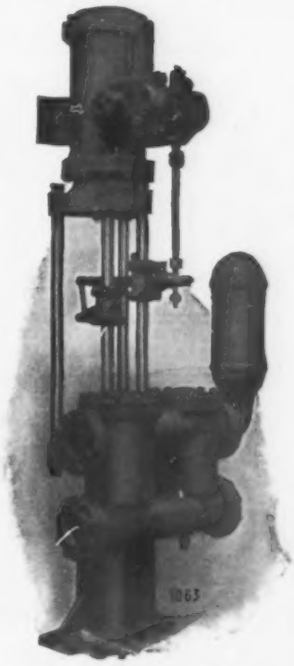
of DEAN BROS. DURABLE DUPLEX STEAM PUMP is the most important improvement that has been made on the duplex steam pump for twenty-five years.

Send for Catalog No. 102



DEAN BROS. STEAM PUMP WORKS. INDIANAPOLIS.
NOT IN THE PUMP TRUST

MARINE PUMPS VERTICAL, SINGLE



New design embodying all of the good points and eliminating the troubles of the ordinary vertical single pump. Ready in sizes from

8" x 6" x 12"
up to
16" x 12" x 27"

Address all of your inquiries to the Marine Department.

National Transit Pump & Machine Co.
Oil City, Pa.

No. 364

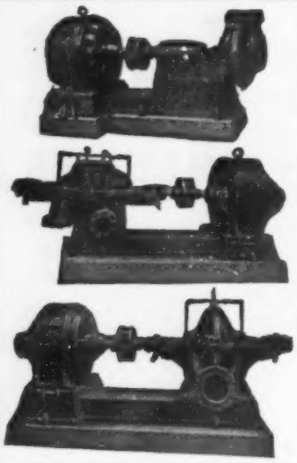


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Working Heads

Give dependable pumping service in either deep or shallow wells. Built in different sizes, with but few working parts, they cover a broad range of pumping work, are easily installed and require but little attention afterwards. They meet efficiency demands in mills, factories, foundries, etc.

It will pay to investigate the Myers before you purchase. Literature and information on request.

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Ashland, Ohio



The Quality That Endures in Pumping

Quality in design, quality in material and quality in workmanship are features that have been insisted upon in the construction of "American" centrifugal pumps for many years.

It has been the maintenance of this standard that has given "American" centrifugal pumps a reputation for the quality that endures.

Catalog 132 describes them. Write for it.

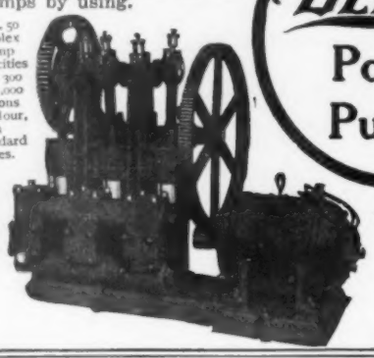
The American Well Works

General Office and Works
Aurora, Ill.
Chicago Office, First Nat. Bank Bldg.

PLENTY OF WATER
At Little Expense

Will be your experience with Deming Power Pumps. Save 40 to 66% over the cost of direct acting steam pumps by using.

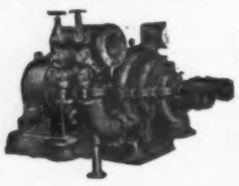
Fig. 50 Triplex Pump Capacities from 300 to 60,000 Gallons per Hour, in Standard Sizes.



DEMING Power Pumps

THE DEMING CO.
SALEM, OHIO

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Henion & Hubbell
Pittsburgh:
Harris Pump & Supply Co.



Let Us Help You Solve Your Pump Problem

Our engineers have made a specialty of solving pump problems. Consequently they can be of great service to you if you are confronted with such a problem.

Let them try. It will cost you nothing.

LEA-COURTENAY CO., Newark, N. J.

New York: 90 West Street
Chicago Office: Conway Bldg.
Boston Philadelphia Montreal Detroit Pittsburgh
Portland, Ore. Minneapolis

CENTRIFUGAL PUMPS

See our advertisement on page 328 of the March 14th issue

ALLIS-CHALMERS MFG. COMPANY
MILWAUKEE, WIS.



THE TERRY TURBINE

is used by Jones & Laughlin, Pressed Steel Car Company and other steel companies for driving generators, pumps and fans, because of its simplicity, reliability and economy.

THE TERRY STEAM TURBINE CO.
HARTFORD, CONN. T-455

TRAHERN ROTARY GEARED PUMPS FOR WATER AND OIL

You can depend on Trahern Circulating Pumps to supply a full, continuous stream of lubricants, with or without pressure to cutting tools on any kind of metal working machines. Send for catalog.

TRAHERN PUMP CO., ROCKFORD, ILL., U. S. A.

DE LAVAL
STEAM TURBINE COMPANY
TRENTON, N. J.

Builders of TURBINE MACHINERY, including Steam Turbines of all capacities for high or low-pressure steam and for direct connection or for belt or rope drive. Complete Turbo-Generator Sets. Centrifugal pumps for all heads and capacities. Centrifugal Blowers and Air Compressors. Speed Reducing Gears. *Write for special bulletins on apparatus in which you are interested.*

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TRADE-MARK

PUMPS

BOYTS, PORTER & COMPANY
CONNELLSVILLE, PA.

Boiler Feed Pumps

Electric and Steam Mine Pumps

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Foster Superheaters

Essential to highest economy in operation of steam plants and of special advantage in long steam lines. Add greatly to life and efficiency of turbines and engines. Applies to any type of boiler; or built with independent furnace. Uniform superheat guaranteed.

Power Specialty Co., 111 Broadway, New York
Chicago, Boston, Philadelphia, Pittsburgh, San Francisco

PUMPS

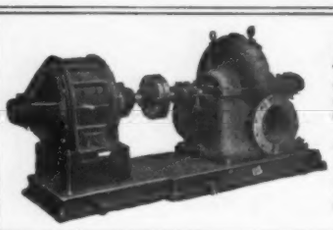
FIRE SPRINKLER EQUIPMENTS
POWER PUMPS
ACID AND MILK PUMPS

Air Compressors for All Purposes

Prompt Delivery

Dealers and Sales Agents Wanted Write for Prices and Catalogues

THE LUCAS-MINER PUMP CO., Dayton, Ohio



Alberger Pumps

Catalog of complete line of single and multi-stage pumps on request.

Alberger Pump & Condenser Co.
140 Cedar St., New York City
Chicago St. Louis Philadelphia

Robt. Wetherill & Co., Inc.

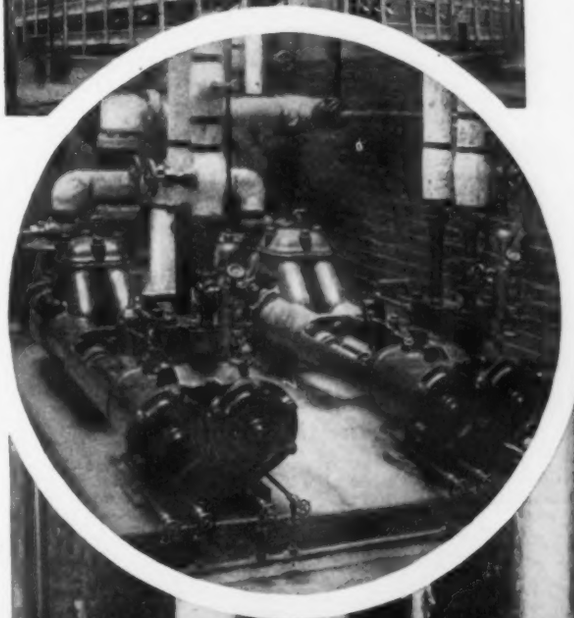
CHESTER, PENNA.

Corliss Engine Builders
Complete Power Plants
Engines and Boilers
Plate and Machine Work

ELEVATORS — Hydraulic Plunger

WORTHINGTON PUMPS





Guarding a big tobacco plant against fire

The Park Avenue (Brooklyn) branch of the American Tobacco Company largely contains materials which, owing to their inflammable nature, are necessarily a greater than usual fire hazard.

Safety of life and property require high class, dependable fire-fighting apparatus. In this respect, the needs of the plant are adequately taken care of by a hose and a sprinkler system, an abundant supply of water for both lines being assured by a Blake-Knowles Underwriter Fire Pump and two Worthington Duplex Pumps.

An installation of this character must possess one supremely important feature—readiness to go in service and deliver its full capacity at all times.

In this fire fighting field, where faulty equipment would be so disastrous, Worthington Pumps have established enviable records for unfailing service.

WORTHINGTON PUMP AND MACHINERY CORPORATION

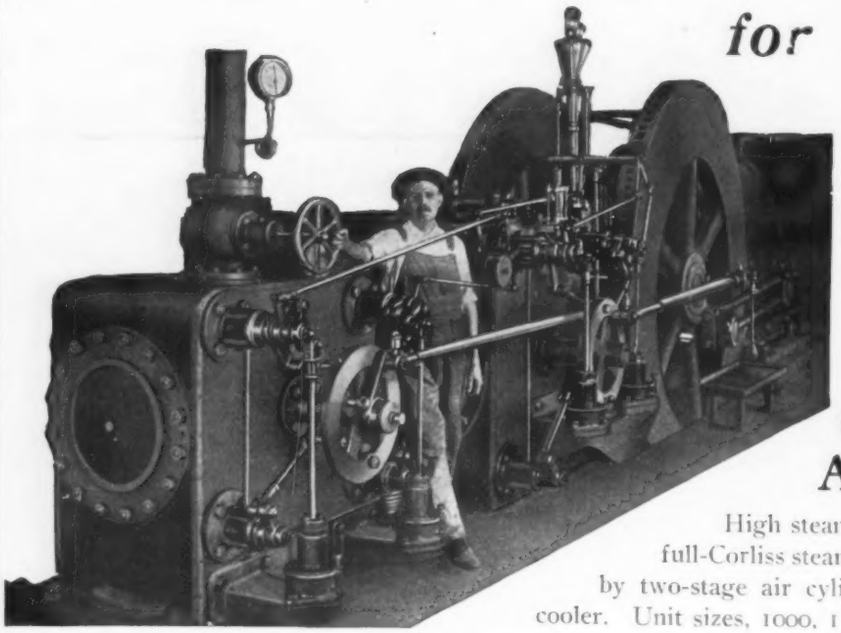
115 Broadway, New York

Branch Offices in all Principal Cities

171.8

MORE AIR POWER

for Less Coal—



plus continuous, year in, year out service, plus floor space and foundation savings, plus economy in care and repair may be looked for if you choose—

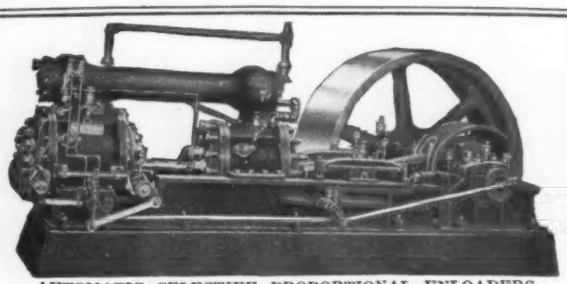
Sullivan Corliss Tandem Air Compressors

High steam economy is gained by tandem, full-Corliss steam cylinders, and air end efficiency by two-stage air cylinders and a big copper intercooler. Unit sizes, 1000, 1500, 2500 and 3000 cu. ft.

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SULLIVAN MACHINERY COMPANY

80 East Adams Street, Chicago, Ill. **30 Church Street, New York**



AUTOMATIC SELECTIVE PROPORTIONAL UNLOADERS
are found exclusively on the

Norwalk Compressor

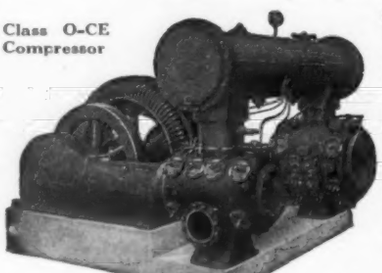
These improvements mark a new era in compressor construction. They gain the instant and favorable attention of all skilled engineers.

For the usual and hackneyed claims of Economy, Durability and Efficiency, let our forty years' experience be an assurance of adequate and discerning attention to every feature.

The Norwalk Iron Works Company, S. Norwalk, Conn.

Chicago Pneumatic Simplate Valve Air Compressors

Class O-CE Compressor



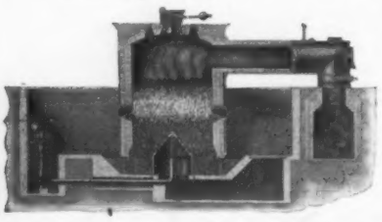
represent the most advanced design in duplex, high speed, inclosed frame, self-oiling machines of their type. Smoothness and Noiselessness of operation are two of their principal features. Their volumetric and mechanical efficiencies are the maximum.

Send for Bulletin 34-M.

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GAS PRODUCERS

Dump Cars **Sand Mills**



Gas Producers 89.8% Efficient By Actual Test.

For Forging, Hardening, Annealing, Open Hearth Furnaces, Glass Furnaces, Lime and Brick Burning.

Get Bulletin No. 126

Industrial Cars Made to Specifications.

GRAY IRON CASTINGS

International Clay Machinery Co.
DAYTON, OHIO, U. S. A.

Chapman Rotary Gas Producers

For Open Hearth Furnaces, Billet Heating, Welding, Annealing, Forging, Lime and Brick Burning, Ore Roasting, Glass Melting, and various Metallurgical and Chemical Processes.

Completely Mechanical and Semi-Mechanical Types

Chapman Engineering Company, Mount Vernon, Ohio

Producer Gas Systems

Using Bituminous and Anthracite Coals.
Raw and Scrubbed Gas for Displacing Oil, City Gas, Coal and Coke in Furnaces of all Descriptions.

WE GUARANTEE RESULTS.

Flinn & Dreffein Co., 431 S. Dearborn St. CHICAGO

NAGLE
Air Compressors

Continuous-Service Air Compressors

There is only one way to build an air compressor—and that is to put into it every dollar's worth of good material and good workmanship that is necessary for the utmost reliability.

A high grade compressor is far less expensive in the end than breakdowns that mean tied up rivetting crews, delayed painting, idle presses.

Every one of the 500 types and sizes of Nagle Compressors —from three to ten thousand feet a minute capacity—is built to keep running, to keep production going.

Write for information.

The Nagle Corliss Engine Works

Designers and Builders of High Grade Engines, Air Compressors and Vacuum Pumps

Main Office and Works: East Avenue, Erie, Pa.

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Philadelphia, Pa.—The Bourse.
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New Orleans, La.—717-743 Magazine St.
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Help Conserve Fuel

USE

Smith Gas Producers

Release fuel oil for the navy and
Increase your production
Better your product
Better your shop conditions

WITH

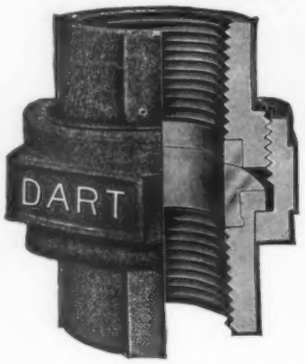
Smith Cold Clean Gas

Temperatures for billet heating, drop forge and practically all steel mill furnace work economically obtained.

Write for Details—
Engineers at Your Service.

THE SMITH GAS ENGINEERING CO.
DAYTON, U. S. A.
FACTORIES: DAYTON AND LEXINGTON, OHIO
Sole Canadian Agents: The Canadian Allis-Chalmers, Ltd.

The Best Union to Join



No leaks possible with the Dart Union—it is absolutely tight.

Bronze to Bronze

feature is the reason why. They are perfectly ground and cannot corrode; iron pipe ends and nuts, no stretching, so they can be used over and over again when changes in pipe line are made.

¶ Send for free sample—a whole fitting that can be tested—and judge it for yourself—that's all we ask. Catalog?

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E. M. DART MFG. CO.
PROVIDENCE, R. I.

THE FAIRBANKS CO.
New York and Branches, Agents

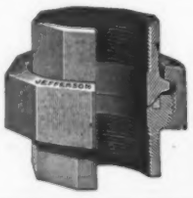
Complete Piping Systems to meet peculiar industrial requirements our specialty



Here are five 10" special "U" bends made on a 2' 7" radius to meet the special demands of the new installations at the works of the H. J. Heinz Co., Pittsburgh, Pa.

The needs of your plant can be met EASILY—ECONOMICALLY—EFFICIENTLY.

Pittsburgh Piping & Equipment Co.
PIP NG ENGINEERS AND CONTRACTORS
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JEFFERSON UNION AND FLANGE

Adapted for Oil, Steam, Water, Gas and Air. No Packing. Guaranteed.

Jefferson Union Co., Lexington, Mass.

GREER OIL CUPS

MANY DESIGNS
MANY SIZES

Write For Catalog and Prices



Style "A" Style "C" Style "G" Style "N" Style "K" Style "L" Style "LW"

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HYDRAULIC VALVES AND FITTINGS

Watson-Stillman valves are designed to perform their functions with ease and safety. The materials are the best obtainable, and each valve or fitting is tested to a safe overload.



Our line embraces an almost endless number of combinations designed to meet the varied requirements of hydraulic systems.

Write for catalogs.

The Watson-Stillman Co.
190 Fulton St. NEW YORK
McCormick Bldg., Chicago

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AMERICAN

Steam and Recording Gauges, Pop, Safety and Relief Valves, Steam and Gas Engine Indicators, Feed Water Grease Extractors, Ideal Steam Traps, and Thermofeed Regulators.

American Steam Gauge and Valve Mfg. Co.
208 Camden Street Boston, Mass.



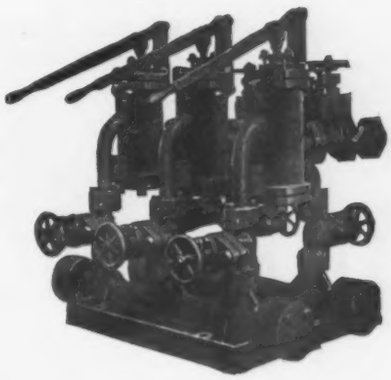
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ENGINEERING APPLIANCES ARE PRIME WAR ESSENTIALS

Stocks of distributors and facilities of manufacturers must be adjusted to care for essential needs.

Lunkenheimer patrons are earnestly requested to assist in the common cause by confining their War Period specifications to essential plants, craft, vehicles or equipment.

"On to Victory" THE LUNKENHEIMER CO. "QUALITY" CINCINNATI.



Operating Valves

Modern blast furnace and rolling mill practice demands the use of Hydraulic Operating Valves for the control of furnace bells and doors, converters, rolls, tables, etc.

We make Critchlow, Tanner and Aiken Operating Valves, and can group them in nests or manifolds to perfect ease and sureness in manipulation, convenience in operation and economy in floor space. We are prepared to design, manufacture and erect installations for all sorts of special service and conditions with direct or remote control.

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PITTSBURGH, PA.

VALVES

Gate and globe patterns and check valves for handling steam, water, air, gas, oil and chemicals.





All-bronze, bronze-mounted iron bodies and all-iron valves. We make a wide variety of standard patterns and will build to order.

Send for our Catalog

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New York: 81 John St.
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Representatives in Boston, Philadelphia, Chicago, New Orleans, Kansas City, Salt Lake City, El Paso, Winnipeg

The Eynon-Evans Blow-Off Valves

The idea is a new one, but the product of 15 years' experience. We guarantee these valves will remain tight under the worst conditions. Write for details.

THE EYNON-EVANS MFG. CO., Philadelphia, Pa., U. S. A.
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Bowes Hydraulic Operating Valves

(Three and four-way patterns.)
No Cup Leathers; operates easily and quickly.
In use by
Carnegie Steel Co., Allegheny Steel Co., Bethlehem Steel Co., Page Woven Wire Co., Carbon Steel Co., Glasgow Iron Works, and many others.

STERLING SPECIALTY COMPANY
NEWCOMERSTOWN - - - - - - OHIO

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The advertisers tell us of the remarkable results that they have received. One firm wrote us as follows:

"Please do not insert our ad for turret lathe again as the first insertion resulted in selling the machine."

What machines do you want to sell? Write us—we will tell you how to go about it and do so at a moderate cost.

CLEARING HOUSE SECTION
THE IRON AGE
239 West 39th Street New York City



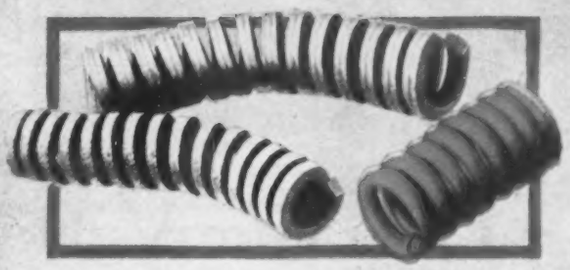
REG. U.S. PAT. OFF.
TRADE JENKINS MARK
Diamond Trade Mark
the positive means of identifying Genuine Jenkins Valves

Hard Fibre Products

SHEETS BUSHINGS TUBES
FRICTION WHEELS RODS
GEAR WHEELS WASHERS

J. SPAULDING & SONS CO.
303-410 Wheeler Street Tonawanda, New York

THE HOME OF



Square and Round Spiral



"Superheat" and Square Duck

Some Goodrich Packing Types

Sheet Packing—Plain and Brass Wire Insertion.

Black Oil Proof.

Combination Rubber and Asbestos.

Cloth Insertion—Red and Black.

Diaphragm Sheet

Hydraulic Packing

Square Spiral Duck—Rubber Faced.

Round Red Core.

Red Tubular Gasket Packing.



The City of Goodrich
Akron, Ohio.

GOODRICH

GOOD PACKING

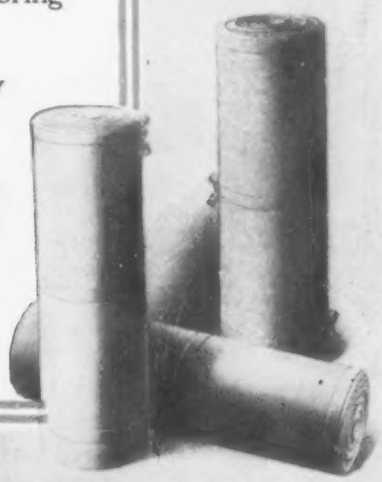
EVERY buyer of Packing in any form, should ask himself these questions before buying—"Is this the best value I can get for my money? What is the story behind it and who is the maker?"

We have been in business for half a century and we believe that when you have solved the above questions you will favor the Packings we have carefully worked out for your various needs.

And remember this. We stand behind every square inch of our Packings as we cannot afford to turn out an article which will not be a "boost" for us, and bring repeat orders.

Try Goodrich Packings. You can easily satisfy yourself as to their merits.

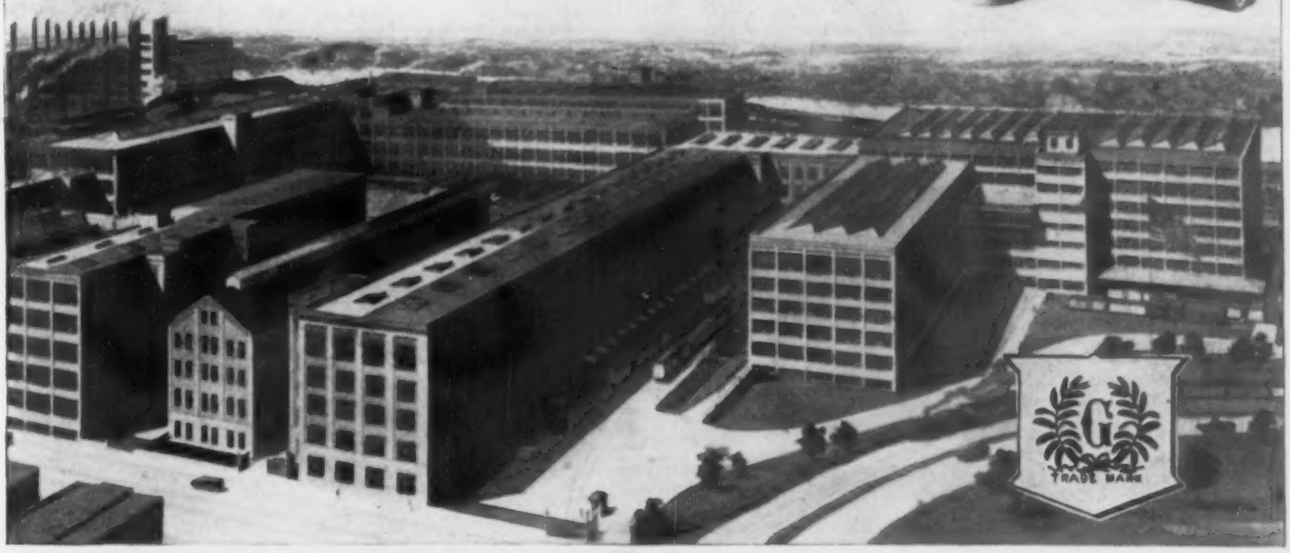
Cloth Insertion



THE B.F.GOODRICH RUBBER COMPANY

Makers of the Celebrated Goodrich Automobile Tires—
"Best in the Long Run"

The City of Goodrich—Akron, Ohio



PACKING

WANTED

Opportunity to quote all users of Washers, Gaskets and Wicks cut from Felt.

We conduct the largest and best equipped shop in the U. S. A.

JAMES H. RHODES & COMPANY

NEW YORK CITY
115 Fulton Street

CHICAGO, ILLINOIS
167 W. Austin Ave.

Also large stock of sheet and roll Felts of every description always on hand.

Low prices plus immediate delivery—meaning big advantage to the buyer in these times.

Booth MECHANICAL FELTS

For every conceivable purpose.

We furnish the raw material and cut felt specialties for many representative manufacturers.

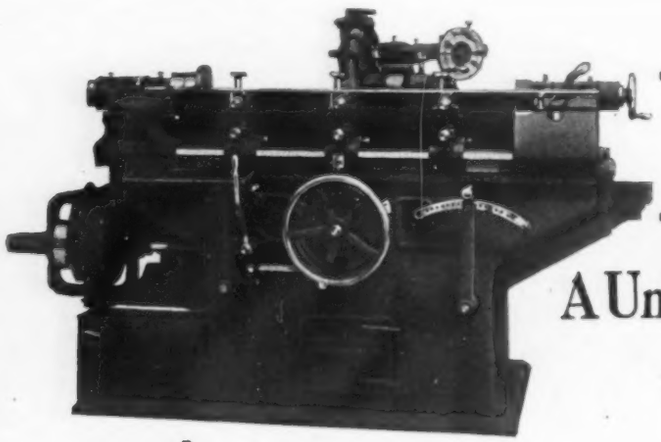
We can serve you satisfactorily, too.

In our factories we have the proper equipment and facilities to cut felt specialties accurately and quickly and fill large or small orders promptly and correctly.



If it's made of felt—Ask Booth.

THE BOOTH FELT COMPANY, Inc.
436-446 19th Street
BROOKLYN, NEW YORK
736 Sherman St., cor. Polk
CHICAGO, ILL.



LANDIS No. 3

A Universal Grinding Machine For Accurate Tool Room Work

The close accuracy, so essential to tool room work, may be obtained as a result of the very rigid construction of the grinding wheel head and also because the "wheel travels."

The type illustrated is the No. 3, capable of swinging work 12" in diameter and 42" long. It combines both an external and internal grinding machine, making it adapted for finishing such work as spindles, arbors, rolls, gauges, bushings for jigs, reamers, milling cutters and work which can be held by a face plate or chuck.

Refer to our catalog for complete details.. Have you a copy?

LANDIS TOOL COMPANY

WAYNESBORO, PA. New York Office: 50 Church St.

THE CLEARING HOUSE

FOR SECOND-HAND MACHINERY AND ALL KINDS OF FACTORY AND RAILROAD EQUIPMENT

ADVERTISING RATES: 1" 1 TIME $4.00, 2" 1 TIME $7.00, 3" 1 TIME $10.50, 4" 1 TIME $12.00
RATES FOR OTHER SPACES AND LONGER TERMS FURNISHED UPON REQUEST

"New York's Greatest Clearing House—J. J. McCabe Lathe & Machinery Corporation"

Apply at the time you buy Used Machinery the same value standards by which you will later judge them.
If you are seeking the utmost in quality and "safety" you will find AT McCABE'S *Your Kind* of Used Machinery.
Everything listed here absolutely in McCabe's own stock.

14-ft. Set of Bending Rolls

"Wickes Bros." Standard Pattern Bending Rolls—14-ft. 2-in. between housings.
Rolls set in pyramid form, with Drop-end housing so as to readily remove plate bent to a full circle. Top Roll—14-in. diam.—power for raising and lowering.
Lower Rolls—10-in. diam.
Complete with 20 H.P. Motor—All absolutely A-1.

12-ft. Gap Bull Air Riveting Equipment

"Albree type" Heavy Bull Air Riveting Equipment with capacity for driving up to 1¼-in. rivets, complete with 20-ton Overhead Crane—operated by Air—as well as 5-ton Auxiliary Air Hoist.
Bull is Cast-Steel.
Distance between Jaws—24-in.
Crane 20-ton capacity, has travel across 24-ft. and travel back about 30-ft., complete with rails.

19-IN. GAP PORTABLE RIVETER

"Albree" type 19-in. throat—capacity for driving 1¼-in. Rivets—Portable style.

60-IN. GAP HORIZONTAL PUNCH

"Hilles & Jones" No. 6 Heavy 60-in. Gap Horizontal Punch, with capacity for punching about 3½-in. thru 1-in. Plate. Arranged for motor drive (but no motor included). Still in operation.

18-FT. PLATE PLANER

Standard Pattern Plate Planing Machine, with capacity for planing 14-ft. Plates in length up to 1½-in. in thickness, having open-end housings so that any length plates can be planed by resetting.

4-SPINDLE BOILER PLATE DRILL

"Prentice Bros." Heavy Boiler Plate Drill, having 4 Radial Arms (Universal) for drilling heavy plates.

BEVEL SHEARS

"Lenox" Rotary Bevel Shears—¾-in. capacity.

14-IN. THROAT PUNCHES (2)

Vertical Punches—capacity for punching up to ¾-in. holes thru ¾-in. plates.

HORIZONTAL PUNCH

8-in. Gap—with ¾-in. capacity.

PORTABLE PUNCH

Pels Portable Punch.

HYDRAULIC PRESS

250 tons capacity—for general all around use.

LATHES

60-in. Swing, 28-ft. bed, Triple-geared.
36-in. Swing, 20-ft. bed, Fitchburg.
36-in. Swing, 16-ft. bed, Putnam.
30-in. Swing, 14-ft. bed, Triple-geared Bement-Miles.
26-in. Swing, 18-ft. bed, Pond, heavy.
24-in. Swing, 12-ft. bed, Putnam.
22-in. Swing, 8-ft. bed, Niles Tool Works.
21-in. Swing, 10-ft. bed, Blaisdell.
18-in. Swing, 10-ft bed, Draper.
16-in. Swing, 6-ft. bed, LeBlond.
15-in. Swing, 8-ft. bed, Rockford.

PLANERS

42-in. x 42-in. x 9-ft. New Haven, 1 Head.
36-in. x 36-in. x 8-ft. Flather, 2 Heads.
30-in. x 30-in. x 6-ft. Pond, 1 Head.
26-in. x 26-in. x 8-ft. Pond, 1 Head.
24-in. x 24-in. x 6-ft. Gray, 1 Head.

TURRET LATHES

28-in. Swing, Pond, rigid type, 4-in. hol. spindle.
21-in. Gisholt gap style, 1⅝-in. hol. spindle.
21-in. Steinle, Grd. Head, 4-in. hol. spindle.
3 x 36-in. Jones & Lamson Flat Turret, Grd. Head.
2 x 24-in. Jones & Lamson Flat Turret, Cone head.

GRINDERS

Universal, Swings 12-in. x 66-in. Landis.
Universal, Swings 12-in. x 36-in. Iroquois.
Planer type Surface Grinder, 26-in. housings. 8-ft. table, Springfield.
Universal Cutter and Tool Grinder, Brown & Sharpe.
Twist Drill Grinder.

GEAR CUTTERS

36-in. Fellows Gear Shaper, with Cutters.
21-in. Gleason Bevel Gear Planer, with complete equipment.

COLD SAWS

28-in. Blade, Heavy, Espen-Lucas, capacity 9-in. round.
15-in. Blade, Higley, capacity 6-in. round.
12-in. Blade, Higley, capacity 5-in. round.

MILLING MACHINES

"Planer type" 24-in. between housings. Table 12-ft. in length, Horizontal Spindle, Bement-Miles.
Open-side Miller. Table 60-in. x 12-in. Horizontal and Vertical Head, Newton.
Lincoln Millers. Tables 28-in. x 7-in.

BORING MILLS

54-in. Car-wheel Borer, Hub facing Att., Niles.
36-in. Vertical Turret-head Chucking Machine, Brown & Sharpe.

DRILLS

Multiple, 4-spindle, Niles Tool Works, Heavy Pattern. Capacity 1½-in. holes. Table raises and lowers.
Upright, 32-in. Swing, Sliding-head, Snyder.

SLOTTER AND KEYSEATER

30-in. stroke "Baker Bros." Working Table, 36-in. diam., 12-in. hole. Automatic feeds to Table in all directions. Bary carrying Cutting-tool can be any shape or size up to and including 4½-in. diam. Wheels up to 72-in. diam. can be key-seated, or by making slight changes and diameter of wheels can be handled

MISCELLANEOUS

Cutting-off and Centering Machine, 10-in., Bement-Miles, Double-end.
Shaft Straightening Machine, for Pipe and Shafting up to 10-in. diam. and 32-ft. in length, Medart Co.'s
Drop Hammer, 900-lbs. Belt-lifter, Williams & White.
Pipe Machine, 4-in. Jarecki.
15 H.P. Gas Engine, Fairbanks-Morse.

J. J. McCabe Lathe & Machinery Corporation
149 Broadway, New York

Harris Bros. Co., Chicago, offer from stock—

RAILS

1,800 tons 70 lb.

250 tons 85 lb.

150 tons 40 lb.

complete with angle bars and spikes for immediate delivery.

6 miles 36" gauge portable track with steel ties, 20 & 25 lb.

ROLLING MILL STAND

One new rolling mill stand for finishing ends 72" plate mill, two rolls high, 24" diameter by 72" arranged for direct connection.

One 16" rolling mill, three rolls high, two stand, direct connected to a steam engine.

PLATE BENDING ROLLS

1—10' Niles plate bending roll, for ½" plate.

1—8" Bending roll for ¾" plate
Angle iron bending rolls for 4 x 4 x ½" angles

1—4' hand power roll, cap. 10 gauge material

WATER PIPE

50,000 feet 1"
35,000 feet 1¼"
65,000 feet 2"
48,000 feet 2½"
8,000 feet 3"
15,000 feet 4"

13,000 feet 1½" double extra strong seamless steel tubing, good for 5000 lbs. pressure, fitted with Briggs threads each end, and couplings.

LOCOMOTIVES

2—20"-Gauge steam locomotives

1—24-Ton Shay geared std. gauge locomotive

1—50-Ton 4-wheel std. gauge.

1—60-Ton American & Baldwin

1—65-Ton American & Baldwin

10—6-Wheel American locomotive 61 & 63 ton, 180 lbs. pressure.

PUNCHES AND SHEARS

1—Heavy duty gate shear with 21" blade, 11" throat, capacity cutting up to 1½" plates, spur gear 42" diameter by 10" face

1—40" Rock River Stake Horn Riveter ½"

1—Bement Miles combined punch and shear; depth of throat 22", shears 6 x 1" flats

1—Single end shear, 22" throat

1—Lennox rotary bevel shear, cuts ½" plate

1—Kling rotary shear 16" throat

1—Lennox rotary plate splitting shear; will shear rounds and flats ¾"

MOTORS

1—200 H.P., 110 volt B.C.
1—150 H.P., 220-440 volt, 60 cycle, 3 phase, squirrel cage
1—100 H.P., 110 volt, direct current card
Quantity of motors, both A.C. and D.C. ranging from 2 to 20 H.P.

MAGNET GENERATOR

1—42" Cutler & Hammer Co. lifting magnet with generator and controller

STEAM HAMMERS

Bement Miles 800 lb. single frame Steam Hammer.
400-800 lb. Board Drop Hammers.
1—400 Miner & Peck Board Drop Hammer.
1—800 lb. Merrill Board Drop Hammer.
2—100 lb. Rope Lift Drop Hammers.
1—100 lb. Little Giant Upright Trip Hammer.
1—Boss Novelty 75 lb. Upright Trip Hammer.
1—30 lb. Rochester long wooden Helve Trip Hammer.
1—30 lb. Bradley short wooden Helve Trip Hammer.

STEEL TANKS

20—10,000 gallon storage tanks
4— 5,200 gallon storage tanks
2— 4,000 gallon storage tanks
2— 3,000 gallon storage tanks
1— 5' x 24' pressure tank
2—60" x 18' pressure tanks
1—54" x 12' pressure tank
25—16" x 46" pressure tanks
1—20' dia. 135' high water tower tank, made of plates ½", ⅜" and ¼", reinforced, including ladder.

LOCOMOTIVE CRANES

1—20 ton O. & S. 8-wheel 42½' boom

1—30 ton Industrial 8-wheel wrecker, 32' goose-neck boom

1—40-ton Bucyrus 8-Wheel, 55' boom

1—2-ton, 4-wheel railway type, 110 volt storage battery electric locomotive crane; boom 15', full revolving with motors and controllers.

MACHINE TOOLS

Pedrick & Ayer Planer type traveling head shaper. Length of travel 6', cross rail 25" overhang from bed, travel of tool head 20" from bed

24" Hendey Shaper

15" Dreses screw machine, 1½" auto chuck, capacity B.G., Fric. Hd. P.F., to turret.

Hoefer heavy 2 spindle adjustable gang drill, weight about 8000 lbs.

NUT AND TAPPING MACHINE

6 spindle 1½" vertical nut tapping machine (Acme type).

AIR COMPRESSORS

4—18 x 29 x 18 x 24 Laidlaw-Dun & Gordon

1—14 x 22 x 14-16 Chicago Pneumatic Tool Co.

50—9½ x 9½ x 10 Westinghouse air-cooled locomotive compressors

2—1200' Ingersoll — Imperial type low duty 22 x 14 x 16 x 16

1—16 x 16¼ x 18 Ingersoll-Sergeant

SURFACE CONDENSORS

1—1400' Wheeler
3— 600' Worthington
2— 500' Worthington
1—1500' Baragwanath
1—1200' Baragwanath

PIPE THREADING MACHINES

4" Armstrong Pipe Machine
6" Merrill Pipe Machine
4" Bignall & Keeler Pipe Machine
60" Niles Semi-Automatic Shur gear cutter

BIG VALVES

3—24" Atwood standard F.F.D. raising stem gate valves.
1—42" std. F.F.D. Chapman raising stem gate valve.
5—16" std. F.F.D. Kennedy non-raising stem gate valves.
7—24" extra heavy F.F.D. Crane gate valves.
3—8" extra heavy F.F.D. Michigan raising stem gate valves, with by-pass.
Large stock of smaller sizes. Write for list.

LARGE PUMPS

3—16 x 10¼ x 14 outside packed Knowles

2—7½ x 5 x 10 Warren

1—14" x 8½ x 10" Worthington

1—16" x 10¼ x 10" Worthington

1—16 x 28 x 15½ x 30 Wilson Snyder Duplex Pump, with 10 x 14 x 18 jet condenser

1—18 x 29 x 16½ x 18 Laidlaw Dun & Gordon compound Duplex Pump.

Harris Bros. Co., 35th and Iron Sts., Chicago

Harris Bros. Co., Chicago, offer from stock—

300 H. P. BOILERS

3—Wickes Brothers vertical boilers, pressure type, quadruple riveted, butt strapped, equipped with Murphy stokers and all breeching connections. These boilers are located at Detroit, Mich., and shipment can be made at once. Hartford inspection 151 lbs. pressure.

AIR LOCOMOTIVES

2—24" gauge 5-ton Porter compressed air locomotives, 22½-ton hauling capacity; tractive power 1450 lb.; charging pressure 1200 lb.; capacity of main reservoir 41 cubic feet; engine fitted complete. Built in 1915; have seen little service, are in A-1 condition.

DUMP CARS

150 Western & Oliver type all-steel 12 yd. dump cars, which we offer for sale or lease. These cars are located at various points in the East.

WIRE CABLES

Several thousand feet of steel wire cable, ranging in sizes from ⅞ to 2". Send us a memorandum of your requirements.

STEEL BRIDGES

1—102' long by 16' wide high truss type single track railroad bridge; pin connected.

1—100' long by 16' wide, high truss type single track railroad bridge; pin connected.

1—88' long by 16' wide high truss type single track railroad bridge; pin connected.

HOISTING ENGINES

1—7 x 10 double cylinder, single drum Mundy hoisting engine, skeleton type.

3—4½ x 6 double cylinder, single drum Stroudsburg hoisting engine.

1—8¼ x 10 double cylinder, double drum Florey hoisting engine, skeleton type.

1—9 x 10 double cylinder, double drum Russell Wheel & Foundry Company engine.

1—Double cylinder, double drum Florey hoisting engine, skeleton type, cylinders 8¼ x 12.

1—7 x 10 double drum, double cylinder Mundy.

400 H. P. WATER TUBE BOILERS

2—400 H.P. Atlas water tube type, 4" tube, complete with fronts and castings, 150 lbs. pressure, Hartford.

WATER TUBE BOILERS

1—400 H.P. Kennicott horizontal type, complete with castings and fittings.

MARINE TYPE

2—150 H.P. Morrison type boiler, 150 lbs. pressure.

CORLISS ENGINES

1—12 x 36 Vilter girder frame.
1—16 x 42 Hamilton girder frame.
1—18 x 36 heavy duty Bates.

AUTOMATIC ENGINES

1—15" x 15" Ames; C.C.
1—12" x 16" Chandler & Taylor; S.C.

ROLLING MILL TYPE ENGINE

1—20 x 30 heavy duty rolling mill engine, Wm. Tod. Approximately 15-ton flywheels, with couplings for rolling mill connection. This engine is located in South Milwaukee in rolling mill plant and can be delivered at once from present location.

ELECTRIC HOISTS

1—10 ton Shepherd electric hoist, 110 volt, direct current, with trolley to run on I beam.

1—2 ton Brown electric hoist, two motor, 110 volt, direct current, operates on I beam, complete with 1200', 8" I beam runway.

STEEL BUILDINGS

1—Steel building, 76' clear span, any length up to 600' long. Columns 30' to bottom chord. This is a well constructed building, and could be equipped for light crane.

1—Steel roof complete, 80' clear span, 340' long, consisting of 17, 80' hip trusses, purlins, wind bracings, etc.

1—Steel frame building 80' x 140', consisting of columns, trusses, purlins, window framing, bracings, etc.

1—Flat roof, steel frame building, 80' clear span, 160' long, 40' columns, all complete with purlins, wind bracings, etc.

1—Steel building, L shaped, 450 x 50 feet x 162 x 150 feet, 15-ton Electric Crane, center bay—5-ton Electric Crane, L. Bay. Two 2-ton cranes, mono-rails, hoists, etc.

1—Lot consisting of 40—76' clear span flat roof trusses.

LATHES

1—30 x 16 Lodge & Shipley triple geared, quick change feed, motor drive, with 220 volt, 60 cycle, 10 H.P. motor.

1—20 x 12 Lodge & Shipley patent head, quick change feed attachment, motor drive, complete.

Other motors in all sizes.

20" PIPE

15 miles of 20" spiral riveted A. & R. pipe with flanged compression connections. This pipe, made of No. 8 gauge, is in A-1 condition. Delivery can be made immediately.

INDUSTRIAL CARS

150—20" gauge, 1 yd. cap., "V" shaped and one-side dump cars.

75—Flat top 20" gauge Industrial all steel cars.

118—24" gauge K. & G. box cars, 30 cubic feet capacity.

67—24" gauge Atlas flat cars.

MARION STEAM SHOVEL

1—No. 14 Railway type, ¾-yard Marion steam shovel, ¾" revolving, independent crowding engine, slewing and hoisting engines. This rig, located at North Carolina, is in good condition. Can be shipped at once.

OVERHEAD TRAVELING CRANES

1—4 ton, two motor electric crane, 20' span, 220 volt.
2—75' steel plate girders, equipped complete with 20 ton capacity hand power trolley.
1—25 ton hand power traveling crane.

DIRECT CONNECTED UNITS

1—125 KW., 125 volt D.C. generator, direct connected to 18 x 18 Ames automatic center crank engine, with switchboard and all equipment.

CHAIN HOISTS

3—20 ton Chisholm & Moore chain hoists.
1—30 ton Chisholm & Moore chain hoists.
1—8 ton Chisholm & More chain hoists.

Harris Bros. Co., 35th and Iron Sts., Chicago

EASTERN & EQUIPMENT 99 MACHINERY COMPANY.

99 PER CENT SATISFIED CUSTOMERS

COMMERCIAL TRUST BLDG. PHILADELPHIA, PA.

GIVE US AN OPPORTUNITY TO QUOTE ON YOUR REQUIREMENTS.

OUR SPECIAL OFFER

The following list of tools need no rebuilding, for all practical purposes are as good as new. Note condition following each tool.

1—New 60″x30′ Fifield Engine Lathe. Triple back gear face plate drive.

1—96″ Vertical Cylinder Boring Mill, suitable for boring cylinders from 24″ in diameter to 96″ in diameter, 12′ long; 2-H-90%.

1—Espen-Lucas two-spindle Horizontal Boring and Drilling Machine, 6″ dia. bars, independent motor drive, bed plate 60″x84″; 1-H-90%.

1—Type C.K.D. 246D Schatz Patent Shearing Machine, will punch 5/8″ hole in 7/16″ stock; 1-H-98%.

1—Wm. Sellers Vertical Grinding Machine for grinding discs up to 80″ diameter, both internal, external and surfaces. Accuracy guaranteed .0001 of an inch; 1-H-98%.

2—2¾″ capacity Cleveland Automatic Screw Machines; 1-H-95%.

2—4″ Crane Pipe Machines, capacity from 1″ to 4″, complete with variable speed motor, 220 D.C. and complete set of dies; 1-H-95%.

1—24″ Gould & Eberhardt Shaper, single pulley drive; 1-H-98%.

1—36″ Fellows Gear Shaper; 1-H-90%.

1—Farrell Horizontal Boring and Drilling Machine, 4″ dia. spindle, No. 6 Morse taper; 2-H-88%.

1—6′ Baush Radial Drill, cone drive, back gear, tapping attachment; 2-H-90%.

4—No. 60½ Bliss Presses, geared design; 1-H-98%.

1—Garrison Geared Stamping and Trimming Press, stroke 5″; 1-H-90%.

1—200 ton Hydraulic Press, 1 vertical ram and 2 side rams, intensifier and valves; 2-H-90%.

2—1300-ton Hydraulic Cartridge Case-Heading Presses; 1-H-98%.

1—10′6″ No. 510 Loy & Nawrath Heavy Power Bending Brake; 2-H-90%.

1—Special 4″ diameter Bar Horizontal Boring Mill, 36″ traverse, back gear and power feed; 2-H-93%.

KEY TO CONDITION OF MACHINERY

No. 1—Denotes Latest Design. **L—Denotes Light Pattern.**
No. 2—Denotes Modern Design. **M—Denotes Medium Pattern.**
No. 3—Denotes Old Design. **H—Denotes Heaviest Pattern.**

General condition of machine is stated in percentage. (New machines=100%)

1-H-98%—Denotes latest design, heaviest pattern and 98% as good as new.

EASTERN 99 MACHINERY & EQUIPMENT COMPANY.
99 PER CENT SATISFIED CUSTOMERS
COMMERCIAL TRUST BLDG. PHILADELPHIA, PA.

New and Used Machinery

ENGINE LATHES

1—32" x 16' Pond Engine Lathe, 5-step cone, 4" belt, T.B.G. face plate drive, slip-pin semi-quick change gear, taper attachment; 2-H-85%.
1—NEW 29" x 22' "McCabe" Engine Lathe, 3-step cone, D.B.G., H.S., Q.C.G.
1—NEW 29" x 20' "McCabe" Engine Lathe, 3-step cone, D.B.G., H.S., Q.C.G.
1—NEW 29" x 16' "McCabe" Engine Lathe, 3-step cone, D.B.G., H.S., Q.C.G.
1—NEW 20" x 8' United States Heavy Duty Engine Lathe, Q.C.G., D.B.G., H.S.
1—18" x 18' Lodge & Shipley Engine Lathe, Q.C.G., H.S.; 2-H-98%.
1—15" x 6' Flathers Engine Lathe, Q.C.G., H.S.; 1-H-98%.
1—NEW 12" x 4' 3" Shepard Engine Lathe.

TURRET LATHES

1—NEW No. 4 National Woodworking Turret Lathe.
1—28" Gisholt Turret Lathe, 3¼" hollow spindle, back gear, motor drive, 10 H.P., 220 volts D.C.; 2-M-90%.
1—24" Steinle Turret Lathe, 4" hole in spindle, full turret equipment; 2-H-88%.
1—24" Gisholt Turret Lathe, 6¼" H.S., B.G., Power feed automatic stops; 1-H-93%.
7—Fay Automatics, standard equipment, also special equipment for 3" shells; 2-H-90%.

SCREW CUTTING LATHES

3—2¾" Cleveland Automatic 6 hole turret Screw Machines. 1-H-95%.
2—2" Cleveland Automatic Screw Machines, Model "A". 2-H-90%.

CHUCKING LATHES

2—Potter & Johnston Chucking & Turning Machines, Model 6A, 4½" hole in spindle; 2-H-93%.
2—Potter & Johnston Chucking & Turning Machines, Model 6A, 2½" hole in spindle; 2-H-93%.
1—Potter & Johnston Chucking & Turning Machine, Model 6A, 2" hole in spindle; 2-H-93%.
1—Potter & Johnston Chucking & Turning Machine, Model 6A, 2 11-16" hole in spindle; arranged for motor drive, motor included; 2-H-93%.
3—Potter & Johnston Chucking & Turning Machines, Model 6A, 2¼" hole in spindle, gear feed; 1-H-93%.
2—Potter & Johnston Chucking & Turning Machines, Model 5A, 2" hole in spindle, gear feed; 1-H-93%.

MILLING MACHINES

7—No. 3 Cincinnati Plain Milling Machines, 4-step cone, 3" belt, quick change gear feed mechanism; 2-M-90%.
6—No. 3 Cincinnati Plain Milling Machines, 4-step cone, 3" belt, cone feed mechanism; 2-M-90%.
1—No. 3 Cincinnati Universal Milling Machine, 4-step cone, 3" belt, quick change gear feed mechanism; 2-M-90%.
1—No. 2 Cincinnati Universal Milling Machine, 4-step cone, 3" belt, vise, dividing head and chuck, countershaft; 1-H-98%.
1—No. 2 Hendey Universal Milling Machine, 4-step cone, B.G., automatic stops, quick change feed; 2-H-90%.
1—No. 1½ Vanderbeck Universal Milling Machine; 3-M-85%.
1—No. 1 Standard Hand Milling Machine, 3-step cone, 2½" belt; 1-H-95%.
1—No. 1 Milwaukee Plain Milling Machine, dividing centers, vise, cam attachment; 2-M-90%.
1—No. 3 Lees-Bradner Thread Miller; 1-H-98%.
2—6" Morgan Thread Millers.

GEAR MACHINERY

1—24" Barker Gear Shaper; 2-H-95%.
1—24" Fellows Gear Shaper; 2-M-95%.
1—36" Fellows Gear Shaper; 1-H-93%.

BORING MILLS

1—4" dia. bar Crane Horizontal Boring Mill; 2-H-93%.
1—96" Vertical Cylinder Boring Mill, suitable for boring cylinders from 24" in diameter to 96" in diameter, 12' long; 2-H-90%.
1—26" Cincinnati Vertical Boring Mill, with 3 jawed independent chuck; 2-M-90%.

DRILL PRESSES

1—8 spindle Type D No. 9 Natco Multiple Spindle Drill; 1-H-95%.
1—30" Niles Radial Drill with countershaft and hanger; 2-H-90%.
1—NEW 3½' Canedy-Otto Radial Drill.
1—NEW Wall Radial Drill, 8' radius.
1—36" Gang Radial Drill, cone drive, back gear, power feed; 2-H-90%.
1—3½' Semi-Universal Radial Drill.
1—Barnes Horizontal Drill; 1-M-90%.
1—32" Hamilton Sliding Head Drill Press; 1-M-90%.
2—Baker High Duty Drills, Style P3; 2-H-90%.
1—25" Foote Burt Heavy Duty Drill, single pulley drive, speed box, 1¾" capacity; 1-H-93%.

PLANERS

1—30 x 30 x 8' Pease Planer.
1—36" x 36" x 16' Lane Planer; 2-M-80%.
1—26" x 26" x 10' Putnam Planer, one head on rail; 2-M-90%.
2—NEW 26" Lynd-Farquhar Openside Planers.
2—16" x 16" x 3' Pratt & Whitney Planers; 2-M-90%.

SHAPERS AND SLOTTERS

1—30" Putnam Shaper, gear drive; 2-H-85%.
1—24" Hendey Shaper, back gear; 2-M-90%.
1—28" Smith & Mills Geared Shaper, back gear; 2-M-90%.
1—24" Gould & Eberhardt Shaper, single pulley drive; 1-H-98%.
1—8" William Sellers Slotter, rotary table, power feeds, cone drive; 2-M-90%.
1—12" Niles Slotter, stroke 12½"; 3-M-90%.

GRINDERS

1—10" x 50" Norton Plain Grinding Machine; 2-M-90%.
1—6" x 32" Norton Plain Grinding Machine; 2-H-95%.
1—NEW No. 1 Norton Universal Tool Grinder.
1—NEW Rivett No. 103 Internal Grinder.
1—10" x 24" Universal Internal Grinder, table 46" x 6½". 2-M-80%.
1—No. 1½ Landis Internal Grinder, 2" hollow spindle and boring head; 2-H-93%.
1—Gisholt Universal Tool Grinder; 1-H-98%.
1—NEW Sterling Universal Tool-room Grinder, capacity 10" x 18".
1—NEW 18" x 50" Sterling Plain Grinder.

PRESSES, PUNCHES AND SHEARS

1—Pels Hand Shear; 2-H-90%.
1—Type C.K.D. 246D Schatz Patent Shearing Machine; 1-H-98%.
4—Farrell Straight Side Power Stamping Presses; weight 3500 pounds; 2-M-85%.
1—Waterbury-Farrell Foundry Rack and Pinion Geared Press, stroke 42".
1—Waterbury-Farrell Double Acting Crank Press, strokes 1½" x 2¾"; 2-H-90%.
1—No. 27-K Bliss Toggle Heavy Geared Press, stroke 2½".
1—No. 45-D Ferracute Double Ended Horizontal Screw Press, stroke 36".
1—Garrison Geared Stamping and Trimming Press, stroke 5"; 1-H-90%.
2—NEW No. 666 Toledo Knuckle Joint Embossing Presses, stroke 2".
3—NEW No. 856 Toledo Rack and Pinion Deep Drawing Presses, stroke 40".
4—NEW No. 857 Toledo Rack and Pinion Deep Drawing Presses, stroke 40".
2—NEW No. 873 Toledo Trimming Presses.
2—NEW No. 114 Toledo Straight Side Heavy Double Geared Wiring Presses; stroke 22".
1—NEW No. 14 Toledo Rack and Pinion Reducing Press, stroke 40".

MISCELLANEOUS

2—NEW Wygodsky 50 H.P. self-starting Crude Oil Engines.
2—NEW 2½" Sellers Bolt and Nut Threading Machines, complete set of dies.
1—5" Cutting-Off Machine, 3-step cone, power feed, equipped with double scroll chuck; 2-H-88%.
1—Wiley & Russell 2¾" Bolt and Pipe Cutting Machine; 2-H-93%.
1—Espen-Lucas High Power Circular Saw; 1-H-90%.
3—Joseph T. Ryerson Friction Saws, 30" blade; 2-H-90%.
1—NEW 6" x 6" Peerless Regular Belt Driven Power Hack Saw.
1—NEW 9" x 9" Peerless Regular Belt Driven Power Hack Saw.
1—24" x 24" x 30" Rand Air Compressor, 1300 cubic feet per minute capacity; 1-H-93%.
1—2 stage Sullivan Air Compressor, 700 cubic feet per minute capacity; 1-H-95%.
1—NEW No. 14 Shuster Roll Bar Straightener.
3—Sets of large vertical boring mill chuck jaws; 1-H-93%.
1—Set of large vertical boring mill chuck jaws; 1-H-98%.
1—24" x 9' Tank, 3" pipe and manhole connection; tested to 100 lbs.; 90% good as new.
1—36" x 10' Tank, 2" and 4" pipe connection; tested to 100 lbs.; 90% good as new.
1—36" x 14' long Steel Tank, 5" pipe connection, tested to 100 lbs.; 90% good as new.

NEW YORK'S GREATEST STOCK
(PARTIAL LIST)

CRANE

10 Ton Reading Electric Traveling Crane, 52 ft. span, 3 Motors, D. C., 220 volts, cage operated.

PUNCHES and SHEARS BENDING ROLLS

KLING BROS. ROTARY SPLITTING SHEAR, CAPACITY ¾" PLATE ANY WIDTH; motor driven.

Hilles & Jones double end Punch and Shear, 20" throats, capacity 1" in 1", shears 6" x ¾" flats.

Class "E" Queen City single end Punch and Shear, 25" throat, architectural jaw, punch 6" in ½", shear 1" x 6" flats, variable punch holder for one or two punches; weight 16,000 lbs.; good as new.

Farrel single end Punch and Shear, 12" throat, punch 1" in ⅞", shear 8" x ¾" flat, 1½" round, weight about 10,000 lbs.

No. 1 Long & Allstatter Plate Punch, 13" throat, punch 1½" in 1" spacing table 27' long having automatic feed with quick return.

Columbus single end Punch, 24" throat, punch ¾" in ¾".

Reade single end Punch and Shear, 19" throat, punch ½" in ½".

Wais & Roos PLATE BENDING ROLLS, 12' 5" BETWEEN HOUSINGS, ⅝" capacity.

Bertsch Plate Bending Rolls, 10' 6½" between housings, about 1" capacity.

Plate Bending Rolls, 5' 8" between housings.

Hand Boiler Plate Bending Rolls, 6' 2½" between housings.

PLANERS—SHAPERS

55" x 46" x 15' Lincoln four head Stone Planer.

48" x 48" x 13' 5" Betts Planer.

44" x 44" x 14' Fitchburg two head Planer.

32" x 32" x 10' Niles two head Planer.

30" x 30" x 8' Cleveland open-side Planer.

30" x 30" x 8' New Haven Planer.

Two 24" Morton Draw Cut Shapers.

Six NEW 24" HOLLINGWORTH TRIPLE GEARED CRANK SHAPERS; immediate delivery from stock.

New 18" Hollingworth back geared Crank Shaper.

BORING MILLS

10 Ft. Betts Heavy Vertical, Two Heads. Immediate Delivery.

46" Bridgeport Vertical, two heads.
37" Niles Vertical, two heads.
34" Colburn Vertical, one head.
No. 0 Fosdick Horizontal Boring, Drilling and Milling, 3" bar.
No. 1 Beaman & Smith Horizontal Boring, Drilling and Tapping, 3" bar.
Beaman & Smith Horizontal Boring and Drilling, 3" bar.
Niles Car Wheel Boring, takes 36" wheel, table 48" diameter; swinging derrick attached to machine.

MILLING MACHINES

36" x 36" x 12' INGERSOLL HEAVY DUTY HORIZONTAL SLAB, ADJUSTABLE RAIL, WEIGHT 42,000 LBS.
24" x 24" x 8' Newton Slab with vertical and horizontal spindles, adjustable rail.
Ingersoll Slab, 23" between housings, table 20" x 60".
No. 2 Milwaukee Universal.
No. 6 Fox Plain.

ENGINE LATHES

96" x 20' Pond Turning or Boring Lathe, face plate drive.
84" x 16' Putnam, face plate drive.
76" x 18' 10" Fitchburg Turning, double back geared, face plate drive, powerful machine.
50" x 26' Putnam, raised to 72", face plate drive, 18' centers.
50" x 15' New Haven.
48" x 16' Niles Tire or Car Wheel Lathe, double head type, face plate drive, triple geared.
42" x 19' Putnam; heavy duty, raised to 54" triple geared, face plate drive, taper attachment.
36" x 26' Pond Machine Tool Co., face plate drive, 18' 6" centers.
36" x 20' Pond Machine Tool Co., face plate drive, 13' centers.
32" x 16' New Haven, 2⅜" hollow spindle, taper attachment.
30" x 16' Niles, 9' 11" between centers.
28" x 16' Fay & Scott, 2 1/16" hollow spindle, 10' 9" centers.
26" and 48" x 18' McCabe 2 spindle, raised to 38" and 60", face plate drive, 2⅛" hollow spindle; just like new.
26" x 14' Putnam, 9' 1" centers.
26" x 14' Pond. 9' 2" between centers.
24" x 14' Lodge-Shipley quick change Gear, d.b.g., 2¼" hollow spindle, motor driven.
New 18" x 8' Hollingworth quick change and loose change.

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50 CHURCH STREET NEW YORK CITY

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ReMANUFACTURED MACHINE TOOLS
-(ORIGINATED BY US)-

COMPARE THEM WITH NEW TOOLS

Our thorough restoration process through which all Remanufactured machines pass, has no counterpart anywhere in the world. They cannot be classed with mere second-hand machines, nor the so-called "rebuilt" tools. They occupy a distinct place in the machinery field and are firmly established in the recognition of tool users the world over.

RADIAL DRILLS

1—3′ American, single pulley drive.
1—4′ Niles Full Universal.
1—5′ Fosdick Plain.
1—5′ Niles, Bement, Pond Full Universal.
1—6′ Dreses-Mueller Full Universal.
1—6′ Putnam Plain.

MILLING MACHINES

1—#1 Brown & Sharpe Universal.
2—#14 Garvin Mfg. Plain.
3—#14 Garvin Plain.
1—#18 Kempsmith Plain.
1—#1 Pratt & Whitney Lincoln.
2—#32 Kempsmith Lincoln.
1—#4 Newton Duplex.
1—Hilles & Jones Vertical.

PLANERS

1—22″x22″x6′ Gray
1—22″x22″x6′ American.
1—24″x24″x6′ American.
1—26″x26″x6′ American.
1—30″x30″x12′ Gray, 1 hd.
1—36″x36″x8′ Flather, 2 hds.
1—36″x36″x13′ Sellers, 2 hds.

TURRET AND SCREW MACHINES

1—12″ Foster-Kimball.
1—13″ Pearson.
1—13″ Foster.
1—15″ Windsor Fox Monitor.
4—16″ Pratt & Whitney.
1—20″ Pratt & Whitney Geared Head.
1—20″ Pratt & Whitney.
1—21″ Gisholt.
2—22″ Steinle.
1—24″ Foster.
1—1¾″ American Screw.
2—2″x24″ Jones & Lamson.

GEAR CUTTERS

1—No. 1 Robey-Smith Bevel Gear Planer.
2—11″ Gleason Bevel Gear Generators.
1—24″ Fellows Gear Shaper.
1—No. 2 36″ Schuchardt & Schutte Hobber.
1—36″ Fellows Gear Shaper.

GRINDERS

2—No. 210 Heald Piston Ring.
2—18″ Gorton Disc.
1—No. 11 26″ Besly Disc.
1—No. 23 Landis Plain.
1—No. 1½ Landis Internal.

PUNCHES AND SHEARS

1—96″ Robinson Power Brake.
1—No. 2 Bethlehem Slitting Shear.
1—No. 1 Wm. Frech Punch.
1—No. 2 Wm. Frech Punch.
1—Crosby Punch.
1—No. 4-A Willard Inclinable.
1—No. 3 Robinson Inclinable.
1—No. 1-B New Doty Geared Punch.

ENGINE LATHES

1—15″x6′ Von Wyck, taper.
2—18″x6′ American, Full Q.C.G.
1—20″x8′ Whitcomb-Blaisdell, Gd. Hd.
1—26″x12′ Reed.
1—28″x12′ Reed.
1—36″x16′ Johnson Triple Gd., motor drive.
1—36″x20′ New Haven.
1—37″x16′ Springfield.
1—50″x14′ Fitchburg.
1—No. 3 Niles, Bement, Pond Double Axle.
1—Niles Cylinder, 41″ swing.

MISCELLANEOUS

1—Gould & Eberhardt Draw Bench.
1—1½″ Morton Keyseater.
1—4″ Bignall & Keeler Pipe Machine.

Our Guarantee:

Your money back if you return a machine within 30 days from date of shipment, freight prepaid. No Excuses Necessary.

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OF CHICAGO

625 Washington Blvd.

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IRON AGE

BIGGEST and BEST

WATCH FOR GRAVES' SPECIALS!!

96″ BETTS VERTICAL BORING MILL, heavy duty, motor driven, modern, excellent condition.
96″ BICKFORD VERTICAL BORING MILL, modern, excellent condition, belt driven.
84″ SELLERS VERTICAL BORING MILL, heavy type, excellent condition.

PUNCHES AND SHEARS

PELS COMBINATION, double end, punch and shear (armor plate steel frame), three operations.
PELS COPING MACHINE (armor plate steel frame).
JOHN F. ALLEN PNEUMATIC BULL RIVETTER, 24″ gap, latest type.
JOHN F. ALLEN PNEUMATIC BULL RIVETTER, 10″ gap, latest type.
CLEVELAND SINGLE END COMBINATION PUNCH and SHEAR, 24″ gap, type E.F., weighs 13,500 lbs.
CLEVELAND PUNCH, 18″ gap.

ROLLS

BEMENT & SON BOILER PLATE ROLLS, extra heavy, 10′ between housings, 12″ rolls.
STEEL ROLLING MILL, 14″ between housings, 12″ rolls, direct motor drive.
HILLES & JONES BOILER PLATE ROLLS, 9′, heavy type, drop end housings.
Two (2) TOLEDO, 12″ between housings.
TOLEDO, 14″ between housings.
TOLEDO, 44″ between housings.
BLISS, 14″ between housings.
BLISS, 30″ between housings.
Two (2) BLISS, 40″ between housings.

RADIAL DRILLS

6′ BICKFORD, plain, single pulley drive.
6′ BAUSH, tapping attachment, belt driven.
4′ BICKFORD, arranged for motor drive.
3½′ NILES, semi-universal.

SLOTTER

10″ PUTNAM, rotary table, good as new.

ENGINE LATHES

93″x18′ PUTNAM, face plate drive.
84″x19′ PUTNAM, face plate drive.
52″x18′ FIFIELD, face plate drive.
48″x21′ FIFIELD, heavy type.
48″x20′ FIFIELD, heavy duty, face plate drive.
32″x17′ POND, heavy duty, face plate drive.
32″x17′ POND, heavy duty, face plate drive.
Two (2) 30″x12′ ISRAEL JOHNSON, face plate drive, heavy duty.
30″x28′ FLATHER, quick change gear, etc.
Eight (8) 16″x8′ REED PRENTICE, brand new, latest type.

GEAR CUTTERS

48″ Gould & Eberhardt, single pulley drive, excellent condition.
Two (2) 24″ FELLOWS, gear shapers.

PLANERS

48″x48″x16′ DETRICK & HARVEY OPEN SIDE, two rail heads, one side head.
48″x48″x14′ DETRICK & HARVEY OPEN SIDE, one rail head, one side head.
54″x54″x17′ BETTS, two heads.
36″x36″x12′ CINCINNATI, 2 heads.
30″x30″x15′ POND, 2 rail heads, extra heavy.
30″x30″x14′ FLATHER, two rail heads.

SHAPERS

20″ GOULD & EBERHARDT, back geared crank, nearly new.
28″ SMITH & MILLS, back geared, etc.

STEAM HAMMERS

300 lb. Bliss, board drop hammer.
1800 lb. MORGAN, double frame.
1200 lb. MORGAN, single frame.

MILLING MACHINES

Three (3) No. 3 HENDY PLAIN MILLERS.
One (1) No. 2 HENDY, plain.
No. 3 CINCINNATI PLAIN.
No. 3 CINCINNATI UNIVERSAL.

SLAB MILLERS

24″x24″x12′ NILES BEMENT POND, heavy type, horizontal spindle, good as new.
PRATT & WHITNEY, single vertical spindle, 25″ between housings, table 22″x72″.

VERTICAL MILLING MACHINES

Two (2) NEWTON, heavy duty, heavy cutter heads, 36″ diameter.

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1876 THE MACHINERY HOUSE OF THE EAST FRANK TOOMEY, Inc. 1918

LATHES

10"x4' New Climax.
13"x5'6" New Carroll Jamieson.
14"x6' New Carroll-Jamieson Q.B.G.
14"x8' New Carroll-Jamieson Q.C.G.
4—15"x6' New Sidney Quick Change Swing 17".
2—16"x6' South Bend.
16"x7' Fitchburg.
15—17"x8' New National Q.C.G.
17"x8' New Sidney Quick Change D B.G. Swing 19".
19"x8' New Sidney Quick Change D. B.G. Swing 21".
20"x10' Flather.
20"x8' Reed.
24"x20' Reed.
25"x16' New Sidney Quick Change D. B.G. Swing 27".
32"x24' Fay & Scott.
24"x48"x24' McCabe Double Spindle.

TURRET LATHES

2"x24" Jones & Lamson Geared Head.
2"x24" Jones & Lamson Cone Head.
2—24" Davis Chucking Lathes.
4 Spindle ¾" National Acme.
No. 12½ Garvin Back Geared Wire feed.
1—1⅝" S. & K. B.G. Wire Feed.

HORIZONTAL BORING AND DRILLING MACHINES

4" Bar Niles Boring and Drilling Machine.
2½" Bar Warner & Swasey.

VERTICAL BORING MACHINE

26" Table Newton.

PLANERS

36"x36"x8' Gray, Two Heads.
36"x36"x8' Hamilton, Two Heads.
24"x24"x 8' Gray.
18"x18"x 3' Blaisdell.

SHAPERS

4—16" New Steptoe B.G.
2—24" New Steptoe B. G.

MILLERS

No. 2 New Kempsmith Universal with Vertical Attachment.
2—No. 1½ New American Plain.
United States New Hand Miller.
No. 0 New Steptoe Hand.
No. 2 Burke Bench.

GRINDERS

No. 1 Fraser New Universal Grinder.
12"x30" B. & S. Universal.
10"x24" Iroquois.
10"x20" Bath Universal.
8"x 8" Plain—Landis.
No. 3 B. & S. Universal Tool and Cutter.
No. 4 Gardner Disc.

DRILLS

14" New Excelsior Sensitive.
15" New Demco Roller Bearing Bushed
16" New Kokomo Hi-Speed Roller Bearing Bushed, Cap. ⅞" in Steel.
20" New Kokomo Hi-Speed Roller Bearing Bushed, Cap. ⅞" in Steel.
20" Four Spindle New Kokomo Hi-Speed Roller Bearing Bushed, Cap. ⅞" in Steel.
20" New Superior W. & L.
20" New Champion B.G. P.F.
20" New Superior B.G. P.F.
24" New Superior B.G. P.F.
25" New Weigel Tapping Attachment.
30" G. & E. Sliding Head with compound table.
32" New Superior Sliding Head.
20" Rockford Heavy Duty.

HAMMERS

350 lb. Sellers Steam.
250 lb. Little Giant Belt—New.
100 lb. Little Giant Belt—New.
75 lb. Beaudry Belt.
50 lb. Little Giant Belt—New.
25 lb. Little Giant Belt—New.

PUNCHES AND PRESSES

18" Throat Industrial Double End Geared Punch.
No. 2 Stiles Press.
2—No. 1 Stiles Presses.
2—No. 130 New Max Ams Inclinable Presses.
3—No. 126 A. New Max Ams Inclinable Presses.
3—Pels Hand Bar Shears ¾" cap.
Pels Hand Punch cap. ½ thru 5/16".
2—Pels Hand Punches cap. ¼" thru ¼".

METAL SAWS

13"x16" New Peerless High Speed.
9"x9" New Peerless High Speed.
6"x6" New Peerless High Speed.
Espen Lucas Circular Saw.

MISCELLANEOUS

8—No. 304 A New Oster Pipe Machines
9" Sellers Slotter.
16"x10' Automatic Threading Machine.
7' Swing Pitt Lathe.
No. 3 Garvin Profiler.
4"x15" Cleveland Thread Miller.

Steam and Electrical Equipment

WATER TUBE BOILER

1—150 H.P. Babcock & Wilcox Water Tube Boiler, 125 lbs. steam working pressure, with 80 ft. of 36" dia. stack, heater, feed water pump, and damper regulator; complete plant.

STEAM TURBINE A.C. SET

1—110 H.P. De Laval Steam Turbine, direct connected to two 37½ KVA. General Electric, 2300 volt, 60 cycle, 3 phase alternators, with direct connected Exciter.

A.C. OIL ENGINE UNIT

1—375 K.W. Fort Wayne, 3 phase, 60 cycle, 2300 volt Alternator, direct connected to one pair of Diesel vertical Oil Engines.

DIRECT CONNECTED UNITS, 220-250 VOLTS

100 K.W. Crocker-Wheeler, 250 volt, 8-pole compound wound Generator, direct connected to a 14" x 21" Hamilton horizontal Corliss Engine, 150 r.p.m.
50 K.W. Westinghouse, 250 volt, compound wound Generator, direct connected to a Harrisburg horizontal center crank Automatic Engine, 280 r.p.m.

DIRECT CONNECTED UNITS, 110-125 VOLT

100 K.W. General Electric, compound wound Generator, direct connected to a Ball & Wood horizontal compound Automatic Engine, 250 r.p.m.
50 K.W. Bullock, compound wound Generator, direct connected to an Erie City Iron Works horizontal Automatic Engine, 290 r.p.m.
30 K.W. Bullock, compound wound Generator, direct connected to 7½ x 7 Haring double vertical Automatic Engine, marine type.
10 K.W. Keystone, compound wound Generator, direct connected to a Valley Iron Works horizontal Automatic Engine.

AIR COMPRESSORS, BELT DRIVEN

22"x13"x18" Laidlow - Dunn - Gordon, 2-stage belt driven duplex, 1140 cu. ft. capacity.
14"x9"x10" Fairbanks-Morse, 2-stage belt driven duplex, 320 cu. ft. capacity.

AIR COMPRESSORS, STEAM DRIVEN

20"x20"x30" Ingersoll-Sargeant class "A" straight line steam driven, 900 cu. ft. capacity.
15"x15"x14" Hall Steam Pump Co., steam driven, 600 cu. ft. capacity.
12"x12"x12" Laidlow - Dunn - Gordon, 400 cu. ft. capacity.
10"x10"x12" Bury, single, straight line, steam driven, 167 cu. ft. capacity.

OIL ENGINES

1—25 H.P. Mietz & Weiss Horizontal Oil Engine.
1—12 H.P. Mietz & Weiss Horizontal Oil Engine.

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FRANK TOOMEY, Inc.

127-131 North Third Street Philadelphia, Pa.

We Maintain Our Reputation

MODERN TOOLS LOWEST PRICES HONEST METHODS

Win War With Modern Machinery

LATHES

2—13x6 Carroll & Jamison semi-quick change (new).
1—14x5 Seneca Falls, complete
1—14x8 Lodge & Shipley quick change, taper attachment.
1—14x6 Prentiss quick change, complete.
1—14x6 Carroll & Jamison quick change, taper attachment, relieving attachment (new).
2—13x5 Carroll & Jamison semi-quick change (new).
2—13x6 Sebastian gap (new).
2—15x6 Maydrite (new), complete.
1—16x32x12 Fay & Scott gap.
1—18x8 Mueller quick change, double back geared (new).
2—16x8 Greaves & Klusman, complete.
1—21x36x16 LeBlond heavy duty, quick change, double back geared (new).
1—26x14 Shumaker & Boye quick change (new).
1—28x14 Pittsburgh double back geared, complete.
1—26x14 Fitchburgh, complete.
1—90x20 face plate drive massive pattern, Pond, complete.

MILLERS

1—#34 Ohio Universal (new), feeds 34x12x19.
1—#4 LeBlond Universal (new).
1—#2 Kempsmith Universal (new).
1—#1½ Valley City Universal (new).
1—#1 Kempsmith Universal (new).
1—#1 Cincinnati Universal with vertical head (new).
1—#1 Cincinnati plain (new).
1—#2 Kempsmith plain (new).
1—#3 LeBlond plain with vertical attachment.
1—#25 Becker plain.
1—#2 Brown & Sharpe plain.
1—#4-B Becker vertical with rotary table (new).
1—#5 Becker vertical with rotary table, complete.
1—#5-C Vertical Becker with rotary table (new), 54" longitudinal range.
1—Slab Miller, Becker-Brainard, working of table between pockets 84x20, 42" between housings, as good as new.

SHAPERS

1—14" Smith & Mills (new).
1—16" Smith & Mills (new).
1—24" Potter & Johnson Universal (new).
1—28" Smith & Mills triple geared (new).

BORING MILLS

1—Newton-Duplex horizontal, 2½" bar.
1—Binssee horizontal, 2½" bar.
1—#0 Fosdick horizontal, 3⅛" bar.
1—24" Bullard vertical with turret and side head.
1—37" Bertram vertical, one turret head (new).
1—84" Bickford vertical, two heads equipped with 20 H.P. D.C. motor, complete.

GRINDERS

1—#1½ Cincinnati cutter and reamer (new).
1—10x72 Brown & Sharpe, plain.
1—#3 Modern Universal (new).
1—#2 Modern-Ott Universal (new).
1—#5 Duplex internal and external, complete.
1—#60 Heald cylinder.
1—#75 Heald internal.

PLANERS

1—26x26x7 Pond heavy duty, single head.
1—30x30x8 Harrington, single head.
1—36x36x10 Woodward & Powell (new).

AUTOMATIC SCREW MACHINES

1—#2 National Acme, four spindle.
2—4¼" Gridley, complete.
1—⅝" Cleveland, single spindle (new).
1—¾" Cleveland, single spindle, complete.

RADIAL DRILLS

1—3' Morris, plain (new).
1—3½' Cincinnati-Bickford, single pulley drive, tapping attachment (new).
1—4' Prentiss, single pulley drive, plain.
1—5' Prentiss plain, complete.
1—6' Prentiss, single pulley drive, tapping attachment, complete (new).

TURRET LATHES

1—2x24 J. & L. cone drive, bar equipment.
1—2x24 J. & L. geared head, bar equipment.
1—2½x26 Pratt & Whitney, flat, geared head, chuck equipment.

CRANE

1—5-ton Locomotive standard gauge.

MISCELLANEOUS

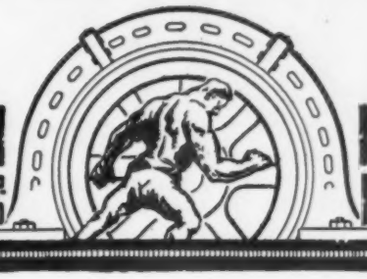
2—14" Nutter & Barnes cold saws.
1—#2 Royersford double end punch and shear, capacity ½", 12" throat.
1—Large Weis & Coes punch and shear, capacity ¾", 18" throat.
1—Newbold circular shear, 14" blade, 22" throat.
1—48" throat Beatty, single end punch, angle jaws and shearing attachment (new).
1—3½-C Bliss Toggle press, practically new.
1—#5 Langelier swaging machine.
1—1600 lbs. Model D Billings & Spencer board drop hammer (new).
1—2000 lbs. Bliss board drop hammer, complete.

MACHINERY GUARANTEED. WE CAN MAKE IMMEDIATE DELIVERY ON ABOVE.

We have in our warehouse for immediate delivery about 500 modern machine tools. Are always equipped to fill any demand. All machines guaranteed. Try us.

MODERN MACHINERY EXCHANGE

52 Walker Street **New York, N. Y.**



MAC GOVERN & COMPANY INCORPORATED POWER MACHINERY

IN STOCK FOR PROMPT SHIPMENT

SURFACE CONDENSERS

2—8000 sq. ft. Wheeler Condenser & Eng'g Co. Admiralty type.
1—8000 sq. ft. Wheeler Condenser & Eng'g Co. with dry vacuum, circulating and hot well pumps.
1—8000 sq. ft. Alberger with rotative dry vacuum pump.
1—6000 sq. ft. Wheeler Condenser & Eng'g Co. with centrifugal and condenser pumps.
1—4200 sq. ft. Alberger hydrono centrifugal, with condensation and circulating pumps.
1—4000 sq. ft. Alberger with duplex air and condensite pumps.
3—4000 sq. ft. Wheeler Condenser & Eng'g Co. with condensite and circulating pumps.
1—3600 sq. ft. Wheeler Condenser & Eng'g Co. with air and circulating pumps.
1—3000 sq. ft. Alberger with centrifugal and hot well pumps.
1—2800 sq. ft. Wheeler Condenser & Eng'g Co. with combined circulating and air pump.
2—2000 sq. ft. Worthington, with dry vacuum pumps.
1—1800 sq ft. Worthington, with dry vacuum and hot well pumps.
1—1500 sq. ft. C. H. Wheeler, with air and circulating pumps.
1—1500 sq. ft. Wheeler Condenser & Eng'g Co., Admiralty type, with dry vacuum and circulating pumps.
2—1380 sq. ft. Worthington.
1—700 sq. ft. Wheeler Condenser & Eng'g Co., with wet vacuum and circulating pump.
1—575 sq. ft. Goubert.
1—525 sq. ft. Frick, round type.

WATER TUBE BOILERS

4—512 HP. Babcock & Wilcox, 200 lbs. pressure.
2—483 HP. Heine, 200 lbs. pressure.
2—480 HP. Stirling, 160 lbs. pressure.
1—400 HP. Babcock & Wilcox, 160 lbs. pressure.
4—360 HP. Erie City, 160 lbs. pressure.
1—310 HP. Stirling, 200 lbs. pressure.
14—290 HP. Babcock & Wilcox, 160 lbs. pressure.
2—283 HP. Aultman & Taylor, 160 lbs. pressure.
2—283 HP. Babcock & Wilcox, 160 lbs. pressure.
3—243 HP. Heine, 160 lbs. pressure.
2—240 HP. Stirling, 140 lbs. pressure.
3—156 HP. Heine, 160 lbs. pressure.

DIRECT CONNECTED ALTERNATING CURRENT UNITS, 60 CYCLE

1—500 Kva. General Electric, ATB, 3 phase, 2300 volts, 120 RPM., dir. conn. to 27" x 42" Hamilton Corliss engine.
1—450 KW. General Electric, ATB, 3 phase, 2300 volts, 100 RPM., dir. conn. to 22" and 42" x 48" E. P. Allis cross compound heavy duty engine.
1—300 KW. General Electric, 3 phase, 2200 volts, 150 RPM., dir. conn. to 19" x 30" x 32" McEwen tandem compound engine.
2—340 Kva. Westinghouse, 3 or 2 phase, 220 volt, 150 RPM., Engine type. No engines.
1—200 KW. Westinghouse, 3 or 2 phase, 220 volt, 116 RPM., dir. conn. to 20" x 42" Hewes & Phillips, horiz., side crank engine.
1—120 KW. Allis-Chalmers-Bullock, 3 or 2 phase, 2400 volts, 277 RPM., engine type. No engine.
1—50 KW. Ft. Wayne, 3 or 2 phase, 60 cycle, 2300 volts, 300 RPM., dir. conn. to 11" x 12" Chuse horizontal engine.
1—50 Kva. Fairbanks-Morse, 3 phase, 2300 volts, type D, 300 RPM., engine type. No engine.

DIRECT CONNECTED DIRECT CURRENT UNITS, 250-275 VOLTS

2—800 KW. Ft. Wayne, MPL, 250-275 volts, 16 pole, 120 RPM., dir. conn. to 26½" and 53" x 36" Erie City heavy-duty cross compound engine.
2—500 KW. General Electric generators, MP-H, 275 volts, 10 pole, 100 RPM., each direct connected to a 32" x 48" Greene engine.
2—500 KW. Fort Wayne generators, MPL, 220-250 volts, 10 pole, 90 RPM., each dir. conn. to a 22" and 38" x 48" Bates cross compound engine.
1—500 KW. Crocker-Wheeler, CCD, 250 volts, 16 pole, 90 RPM., dir. conn. to 22" and 38" x 48" Hamilton cross compound engine.
1—325 KW. Westinghouse, 250 volts, 10 poles, 100 RPM., dir. conn. to 16" and 30" x 42" Hamilton Corliss horizontal tandem engine.
1—200 KW. General Electric, MPC, 275 volt, 8 pole, 150 RPM., Engine type. No engine.
1—75 KW. Allis-Chalmers-Bullock, 250 volts, 6 pole, 275 RPM., dir. conn. to 11" and 18" x 11" Shepard vertical cross compound engine.
1—25 KW. Rochester generator, 230 volt, 6 pole, 400 RPM., dir. conn. to 10"x 8" Buffalo Forge vertical engine.

MOTOR GENERATOR SETS 60 CYCLE

1—300 KW. set consisting of one 300 KW. Gen. Elec. generator, 4 pole, 500 volts, coupled to one 400 HP. Gen. Elec. type I-K motor, 2300 volts, 3 ph., 60 cy., 400 RPM.
1—187 KW. set consisting of one 187 KW. Westinghouse type HS generator, 250 volts, 6 pole, 695 RPM., coupled to one 250 HP. Crocker-Wheeler slip ring motor, 3 phase, 60 cycle, 2300 volts.
1—150 KW. set consisting of two 75 KW. Gen. Elec. generators, form CLB, 125 volts, 6 pole, coupled to one 150 KW. Gen. Elec. synchronous motor, 3 phase, 60 cycle, 2300 volts, 900 RPM.
1—150 KW. set consisting of one 150 KW. Crocker-Wheeler generator, type CCD, 125 volts, dir. conn. on common base to one 225 HP., Crocker-Wheeler synchronous motor, 3 phase, 60 cycle, 440 volts, 900 RPM.
1—40 KW. set consisting of one 40 KW. Gen. Elec. generator, MPC, form L, 125 volts, 6 pole, interpole, dir. conn. on common base to one 65 HP. Gen. Elec. motor, I-K, 3 phase, 60 cycle, 550 volts, 1200 RPM.

25 CYCLE

1—600 KW. set consisting of two 300 KW. National Brake & Elec. Co. generators, type MD, 500 volts, 600 amps., 6 pole, dir. conn. to one 550 KW. synchronous motor, type RD, 3 phase, 25 cycle, 6600 volts, 500 RPM.
2—500 KW. sets, each set consisting of one 200 KW. National Brake & Elec. Co. generator, type MD, 125 volts, 1600 amps., 6 pole, compd. wound, and one 300 KW., type MD, generator, 500 volts, 600 amps., 6 pole, on common base and direct coupled to one 550 KW. synchronous motor, type RD, 3 phase, 25 cycle, 6600 volts, 500 RPM.
1—400 KW. set consisting of two 200 KW. National Brake & Elec. Co. generators, type MD, 250 volts, 1600 amp., 6 pole, compd. wound, on common base and dir. coupled one on either side of one 550 KW. synchronous motor, type RD, 3 phase, 25 cycle, 6600 volts, 500 RPM.

We shall be glad to mail complete list of Electrical Steam and Hydraulic Machinery upon request.

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"BAIRD"—"DETROIT"

IN STOCK FOR IMMEDIATE DELIVERY

LATHES

12— 6"x30" Dalton Precision Bench.
4—14"x 5' Carroll & Jamieson Q. C.
6—14"x 6' Carroll & Jamieson Q. C.
2—11"x 5' Worcester Semi Q. C.
1—16"x 8' Worcester Semi Q. C.
4—11"x 8' Wells Speed Lathes.
1—4½"x84" Lo-Swing.
4—16"x 6' Cincinnati Q. C. D. B. G.
2—16"x 8' Cincinnati Q. C. D. B. G.
3—18"x 8' Cincinnati Q. C. D. B. G.
4—18"x 8' Bradford Q. C. D. B. G.
2—18"x10' Bradford Q. C. D. B. G.
2—20"x10' Bradford Q. C. D. B. G.
1—26"x14' Rahn-Mayer & Carpenter.
1—38"x27' Putnam Heavy Duty.
1—24"x12' Porter Standard.
1—20"x10' Lodge & Shipley Q. C.
1—42"x16' Niles H. D.
1—48"x20' New Haven H. D.
1—60"x18' Shellanbach H. D. D. B. G.

DRILL PRESSES

10—No. 100 U. S. Sensitive.
1—3-Spindle Washburn H. S. Ball Bearing.
6—20" Silver Plain.
4—20" Silver Power Feed B. G.
8—20" Canedy Otto Plain.
6—20" Canedy Otto Power Feed B. G.
2—24" Aurora B. G. P. F. Sliding Head.
3—20" Lindgren Plain All Geared.
1— 5' Cincinnati Bickford Plain Radial.
1— 4' Dreses Plain Radial.
1— 6' Baush Plain Radial.

GEAR CUTTERS

2—No. 3 26" Brown & Sharpe Automatic.
1—No. 2A Newark Gear Cutter.
2—36" Fellows Gear Shapers.
1—No. 6 Fellows Gear Shaper.
1—No. 5 Lees Bradner Gear Generator.
1—No. 1 Farwell Automatic Gear Hobber.
4—Schuchardt & Schutte Tooth Round and Chamfering Machines.

GRINDERS

4—No. 1 Fraser Universal.
1—No. 2 Fraser Universal.
8—No. 1 Wilmarth & Morman Universal.
1—No. 2 Modern Universal.
1—No. 2 Bath Universal.
1—No. 3 Landis Universal.
2—No. 1 Wilmarth & Morman Surface.
3—No. 2 Wilmarth & Morman Surface.
2—No. 3 Wilmarth & Morman Surface.
2—6"x32" Norton Plain.
1—10"x36" Landis Plain Self Contained.
1—12"x36" Landis Plain Motor Driven.
1—No. 1 Capital Internal.
1—No. 34 Van Norman Internal.
1—12" Model A Persons-Arter Rotary Surface.
1— 8" Model A Persons-Arter Rotary Surface.

MILLING MACHINES

2—No. 2 Burke Hand Millers.
1—No. 4 Burke Hand Miller.
8—No. 1 U. S. Hand Millers.
1—No. 1 Standard Hand Miller.
1—No. 3 Rockford Hand Miller.
1—No. 2B Rockford Universal.
1—No. 2 Cincinnati Plain.
1—No. 32 Kempsmith Lincoln Type.
1—No. 3 Le Blond Plain.
1—No. 4 Garvin Plain.
1—No. 3 Le Blond Plain.
2—No. 3 Cincinnati Plain.
2—No. 1 Cincinnati Universal.
1—No. 2 B. & S. Universal (used).
1—No. 2 B. & S. Universal (new).
1—No. 3 Cincinnati Universal
1—No. 4 Le Blond Universal.

BORING MILLS

1—No. 0 Detrick & Harvey Horiz. 3½" Bar.
1—No. 0 Foster Horizontal 3⅛" Bar.
1—48" Niles Horizontal 2½" Bar.
3—36" B. & S. Vertical (Special).
1—44" Gage Vertical.
1—72" Niles Vertical.
1—10' Niles Vertical.

SHAPERS AND PLANERS

1—16" Milwaukee Crank Shaper.
1—20" Milwaukee Crank Shaper.
3—16" Hollingworth Crank Shapers.
2—18" Hollingworth Crank Shapers.
4—21" Hollingworth Crank Shapers.
2—24" Hollingworth Crank Shapers.
1—24" Queen City Crank Shaper.
1—24" Gould & Eberhardt Crank Shaper.
1—24" Cincinnati Crank Shaper.
1—24" Bement Traveling Head Crank Shaper.
1—26"x26"x 6' Gray Planer.
1—24"x24"x 6' Gray Planer.
1—30"x35"x10' Woodward & Powell Planer.
1—36"x36"x16' Lane Planer.
1—42"x42"x10' Detrick & Harvey Open Side Planer.
1—54"x36"x14' Woodward & Powell (2 Heads).
1—60"x38"x12' Patch Planer (4 Heads).
1—72"x72"x16' Pond Planer (2 Heads).
1—66"x66"x30' Be-Ment Planer (3 Heads).

SCREW MACHINES

6—No. 2 Smith Hand Screw Machines, 1" Cap.
1—No. 3 S. & K. Hand Screw Machine, 1¼" Cap.
2—16" Oliver Hand Screw Machines, 2¼" Cap.
1—No. 3 Warner & Swasey Hand Screw Machine. Hollow Hex., 3⅛" Cap.
1—No. 6 B. & S. Hand Screw Machine, 2" Cap.
1—No. 3A Warner & Swasey Universal Hollow Hex., 4⅛" Cap.
2—⅝-⅞" 5-hole Cleveland Automatic.
1—1¼" 5-hole Cleveland Automatic.
1—1½" 3-hole Cleveland Automatic.
1—2" 5-hole Cleveland Automatic.
2—2¼" 5-hole Cleveland Automatic.

MISCELLANEOUS

1—50 lb. Dayton Helve Hammer.
1—75 lb. Bradley Compact Hammer.
1—400 lb. Toledo Board Lift Drop Hammer.
1—1200 lb. Williams & White Rope Lift Drop Hammer.
1—600 lb. Lane Double Frame Arch Type Steam Hammer.
1—1500 lb. Niles Double Frame Steam Hammer.
1—800 lb. Morgan Single Frame Steam Hammer.
2—6"x6" Gardner Vertical Air Compressors.
2—6"x6" Gardner Horizontal Air Compressors.
1—8"x8" Gardner Horizontal Air Compressors.
1—10"x10" Ingersoll-Rand Horiz. Air Comp.
1—1½" Landis Boat Cutter.
1—2" Acme Boat Cutter.
1—2½" Morgan Boat Cutter.
1—No. 5 Long & Allstatter double end Punch, 4" throat, capacity ⅝" in ⅝".
1—Leighton & Hathaway single end Punch, 40" throat, capacity ¾" in ¾".
1—Set Hilles & Jones Pyramid Type Bending Roll, 9½' between housing, capacity ½" plate.

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We Own Every Tool Offered

LATHES

1—60x20 Shellenback H.D. Engine Lathe.
3—New 16x6 Springfield Ideal Engine Lathes.
1—20x8 New Rockford Engine Lathe.
1—16x8 Porter Lathe.
1—16x8 Reed Lathe.
1—14x6 Barnes Lathe.
1—13x8 Barnes Lathe.

TURRET AND SCREW MACHINES

4—3x36 Jones & Lamson Turret Lathe.
1—4¼" Gridley Single Spindle Automatic Screw Machine.
3—#3 Smurr & Kamen Hand Screw Machines.
3—#2 Smurr & Kamen Power Feed Hand Screw Machines.
3—14" Pierce Turret Lathes, New.
3—1x8 Pierce Hand Screw Machines, New.
4—16" Warner & Swasey P.H. Turret Lathes with air chucks.
4—#107 Wells Hand Screw Machines.
2—2" Cleveland Automatic Screw Machines.
1—⅝"-¾" Cleveland Automatic Screw Machine.
8—#52 National Acme 4 Spindle Automatics.
1—#53 National Acme 4 Spindle Automatic.
2—#515 National Acme 4 Spindle Automatics.

GRINDERS AND MILLING MACHINES

1—#60 Heald Cylinder Grinder.
1—#6 Bryant Internal Grinder.
1—New #2½ Woods Cylindrical Grinder.
1—New #2 Woods Cylindrical Grinder.
3—#1 Thompson Cutter & Riemer Grinder, New.
3—#1½ American Plain Milling Machines, New.
1—#0 Brown & Sharpe Plain Milling Machine.
1—#13 Garvin Plain Milling Machine.
4—New Burke Hand Milling Machines.

GEAR CUTTERS

1—#6 Fellows Gear Shaper.
6—#3-36 Brown & Sharpe Automatic Spur Gear Cutters.
2—#3-26 Brown & Sharpe Automatic Spur Gear Cutters.
2—#13 Brown & Sharpe Automatic Spur and Bevel Gear Cutters.

PLANERS, BORING MILLS AND SHAPERS

1—60x45x15' Patch Four Head Planer.
1—36x36x12' New Haven Planer, S.H.
1—30x30x7' New Haven Planer, S.H.
2—24" Milwaukee Shapers, New.
2—16" Milwaukee Shapers, New.
3—20" Milwaukee Shapers, New.
3—20" Columbia Shapers, New.
1—20" Hendey Geared Shaper.
1—26" Davis & Egan Geared Shaper.
1—18" Hendey Geared Shaper.
1—60" Bickford Boring Mill.
1—#3 Lucas Horizontal Boring Mill.

DRILL PRESSES

2—24" Milwaukee Drill Presses, New.
1—2 Spindle Baker H.D. Drill.
1—16 Spindle Natco Drill.
1—12 Spindle Pratt & Whitney Drill.
3—20" Buffalo B.G. P.F. Drill Presses, New.
3—20" Buffalo Drill Presses, New.
1—38" New Haven P.G. Drill Press.
1—14" Henry & Wright H.S. Drill Press.
3—8" Langelier H.S. Drill Presses.
1—Hammond Flexible Arm Radial Drill, T.A.
1—3½' Canedy-Otto Plain Floor Radial Drill.
2—14" U. S. Plain Drill Presses, New.
3—20" Excelsior Plain Drill Presses, New.

PRESSES AND HAMMERS

1—#14 Bliss Toggle Drawing Press.
1—Waterbury-Farrell B.G. Heavy O.B.I. Press.
1—#2-W Bliss Wiring Press.
1—#21 Consolidated Horning Press.
1—#1 Sidney O.B.I. Press, New.
1—#2 Sidney O.B.I. Press, New.
1—#3 Sidney O.B.I. Press, New.
1—800 lb. Billings & Spencer Roll Board Hammer.
1—#2 Williams & White Bulldozer.

STEAM ENGINES

1—20x42 Huetteman & Kramer R.H. H.D. Corliss Engine.
1—15x20 Russell R.H. Automatic Girder Frame Engine.
1—13x16 Erie R.H. 4 Valve Automatic Engine.
1—13½x16 Taylor Automatic Engine.
1—10x16 Brownell R.H. Automatic Engine.

We also carry in stock Steam Pumps, Electrical Equipment and are in the market to purchase good equipment of all kinds.

Riverside Machinery Depot

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Practically New Ammunition Machinery

Ready for immediate delivery

26—32"x14' Pittsburgh triple-geared engine lathes, brand new, with boring bars.
10—Amalgamated boring lathes, suitable for 9 and 12" shells.
20—Gidding & Lewis special boring lathes, 4½" bar, 42" horizontal travel, weight 8 tons each.
92—Simplex 26"x12' boring lathes.
2—Newton sawing and milling machines, for 6" shells.
1—Newton cut-off machine, 48" blade, weight about 5 tons.
3—Southwark Foundry Co.'s 6" Cutting Off Machines, 4 heads, and extra air cylinders.
2—Fisher profile grinders.
Grand Mfg. Co.'s pneumatic riveter.
3—Double head Sullivan grinders, cylindrical, weight about 10 tons each.
28—Automatic Machine Co.'s special thread millers.
Laurie Mfg. Co.'s 6-cylinder banding press, complete with double cylinder hydraulic pump.
Several double-spindle Acme horizontal boring and reaming machines.

SPECIAL—Brand new Conradson duplex turret tool posts.

2—Saylor Washing Machines, capacity for washing 1500 6" shells per day.
19—Consolidated Car Co.'s Bake Ovens.

REBUILT MACHINE TOOLS AT ATTRACTIVE PRICES

PUNCHES AND SHEARS

19" throat Carlin Punch, capacity ¾" thru ¾".
13" throat Punch and Shear, cap. 1" thru 1", belt driven.
Pels 15" I Beam Chopping Machine, belt driven.
2—Double end Potter & McDougall Punches and Shears, 12" throat, capacity 1" thru 1", belt driven.
1—Heavy duty Alligator Shear, capacity 3½" square and 4" round.

VERTICAL AND HORIZONTAL BORING MILLS

2—80" Bement, 2 heads.
40" Rogers, 2 heads.
Beaman & Smith horizontal cylinder boring mill, 6" bar.

PLANERS

72"x60"x14' Gray Planer, 2 heads, about 7 years old.
36"x36"x8' Betts, double head Planer.
30"x30"x8' Pond, 1 head.
30"x30"x8' Pond double head planer.
30"x30"x8' Woodward & Powell, 1 head.
24"x24"x6' Rochester, 1 head.
24"x24"x6' Putnam, 1 head.
1—36"x36"x10' Cincinnati Planer, two heads on cross rail, one side head, arranged for motor drive, modern tool.

SLOTTERS—GRINDERS

4—10" Niles Slotters, modern.
No. 7 Springfield Automatic Surface Grinder.

LATHES—TURRET LATHES

60"x20' New Haven engine lathe, triple geared, face plate drive, screw cutting, 11'8" between centers.
44"x52"x20' Ohl's triple-geared engine lathe, face plate drive, 15'6" centers.
42"x18' Bement, triple geared, face plate drive, engine lathe.
36"x24' Putnam, triple geared, face plate drive, engine lathe.
30"x12' Lodge & Shipley, triple-geared, face plate drive, 2⅝" H. S.
7—22"x10' Davis quick change gear engine lathes, double back geared, 18" 3 jaw universal chuck.
20"x10' Hendey quick-change gear lathe.
12"x6' Reed, practically new.
2—16"x6' Dalton engine lathes.
16"x6' Hamilton engine lathe, hollow spindle, compound rest, power cross feed, etc.
9—2"x24" Jones & Lamson geared head, flat turret lathes, bar and chucking.
5—3"x36" Jones & Lamson geared head, flat turret lathes, bar and chucking.
1—3"x36" Jones & Lamson turret lathe, complete with bar, chucking and full set of collet equipment.
1—Heavy Fish turret lathe, 24" swing, 18" hexagon turret.
No. 3 Pratt & Whitney turret lathe, power feed to turret.
2¼"x24" Warner & Swasey.
2"x20" Bullard, turret has power feed.

MILLING MACHINES

Newton slab miller, 42"x4'9", horizontal spindle.
Ingersoll slab miller, 20"x5', horizontal spindle.
Hendey Lincoln miller, quick change feeds.
6—Hendey pattern Lincoln Miller, quick change feed, table travel 20", size of table 30"x9½", distance from top of table to center of bar 9", 3 step cone 3" belt.
1—Hendey pattern Lincoln Miller, quick change feed, table 14"x36", 3 step cone for 3" belt, complete.
No. 3 Kempsmith Plain, cone drive, BRAND NEW.
2—BRAND NEW No. 3 Kempsmith Universal Milling Machines.
No. 3 Le Blond Plain Milling Machine, complete, with dividing heads and vise.
No. 5 Becker Brainerd Vertical Miller.
No. 3 Brainerd Vertical miller.

DRILLS—SHAPERS

30" Dreses Radial.
3½' Prentiss Radial.
3—20" Davis back-geared drill presses, power feed.
9-spindle Foote-Burt drill, 14" circle.
No. 24 Foote-Burt single pulley drive high speed drill.
2-spindle, long, sensitive bench drill.
Dwight Slate single spindle drill, 12" swing.
3-spindle Prentice drill.
3-spindle Sigourney drill.
Henry & Wright 4-spindle drill.

SAWS—AUTOMATICS

4—18" Higly metal cut-off saws.
1—16" Lea Courtney metal cut-off saw.
15" Lee Simplex Cold Saw.
3—3" capacity Gridley modern automatics, full set of cams and fixtures, chucks, tool-holders.
28" and 18" Q. & C. cold saws.

CUT OFF MACHINES

3—Curtis 6" Cut Off Machines.
8—Espen Lucas 12" double end Cut Off Machines.
1—Espen Lucas 6" capacity, weight 12,000 lbs.
2—Taylor Wilson 6" capacity, weight 12,000 lbs. each.

MISCELLANEOUS

8' Sellers bull riveter.
10'6" bull riveter.
4' Sellers bull riveter.
2" Baker Bros. keyseater.
9' steam driven bending rolls, top roll 10", rolls 8", drop end housings.
No. 6-B Wilbraham Green Blower.
No. 5-B Wilbraham Green Blower.

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DRILLING MACHINES

14″ Rockford, tapping attachment.
21″ Aurora, b.g., p.f., tapping attachment.
25″ Superior, s.h., p.f., tapping attachment.
20″ W. F. & John Barnes, Style A, two spindles, automatic approach and return feed to both spindles.
No. 11 Pratt & Whitney, 10 spindles.

GEAR CUTTERS

No. 1 Adams Hobber.
Reynolds Hobber.
24″x7″ Gould & Eberhardt, for spur.
30″x9″ Gould & Eberhardt, for spur and bevel.
Newton 40″x18″, for spur and bevel.

GRINDERS

No. 1 Cincinnati Universal Cutter and Tool Grinder.
No. 2 Northampton Water Tool.
No. 1 La Salle Tool and Surface.
No. 6 Modern Internal.
Globe Buffer.
Springfield-Brandes Vertical Grinding Planer, capacity 12″x12″x48″.

LATHES

11″x5′ Barnes, foot and belt power.
11″x5′ Barnes, c.r.
12″x5′ Fairbanks, c.r.
12″x5′ Prentiss, c.r., 2 chucks, turret on bed.
12″x7′ South Bend, c.r.
13″x5′ Pratt & Whitney, r. and f.r., taper, 2 chucks.
14″x6′ Reed, c.r., 1 chuck.
14″x6′ Putnam, c.r., 2 chucks.
14″x6′ Fairbanks, c.r., taper.
14″x6′ Flather, c.r., taper.
14″x6′ Prentice, c.r., d.b.g.
15″x8′ Rockford Tool, c.r.
16″x6′ Prentice, c.r., 1 chuck.
16″x8′ Springfield, c.r.
16″x10′ Bradford, p.r.
18″x6′ Bradford, c.r.
18″x8′ Walcott, c.r., 2½″ raising blocks.
18″x8′ Bradford, c.r., d.b.g.
18″x12′ Barker, c.r.
20″x8′ Lodge & Davis, p.r., 1 chuck.
20″x14′ Blaisdell, c.r.
48″x20′ Sellers, c.r., t.b.g.

MILLING MACHINES

No. 2 Chicago Hand.
No. 1 Burke, on stand.
No. 24 Brown & Sharpe, plain.
No. 26 Becker, plain.
No. 2 Brown & Sharpe, universal.
No. 24 Oesterlein, universal.

PRESSES, PUNCHES AND SHEARS

No. 1 Michigan, O.B.I.
No. 2 Rockford, O.B.I.
No. 16 Crosby, O.B.I.
No. 19 Bliss, O.B.I.
No. 20 Thiem, O.B.I.
No. 3 Bauroth, O.B.I.
No. 4 Rockford, O.B.I.
No. 4 Long & Allstatter Plate Shear, capacity ½″ plate (new).
No. 105½ Bliss Circle Shear, 12″ throat, 12 gauge.

SCREW MACHINES

No. 1 Warner & Swasey, plain head.
No. 2 Pratt & Whitney, friction back geared.
No. 3 Bardons & Oliver, plain head.
No. 3 Pratt & Whitney, double friction head, a.c. and w.f.
No. 9 Bardons & Oliver, friction head, a.c. and w.f., power feed to turret and cut-off slides.

TURRET LATHES

No. 2 Foster-Kimball, plain head.
16″ Lodge & Davis, back geared.
25″x7″ Niles Chucking.
2″x24″ Jones & Lamson, bar equipment, cone head.
2″x24″ Jones & Lamson, chucking equipment, cone head.
3″x36″ Jones & Lamson, bar equipment, single pulley drive.
21″ Gisholt, 2″ hole in spindle, arranged for motor drive, with 5 H.P., D.C., 220 volt motor.
21″ Gisholt, taper attachment.
24″ Gisholt, taper attachment, 2½″ hole in spindle.
No. 6-A Potter & Johnson, automatic.

MISCELLANEOUS

No. 1 American Air Tempering Furnace.
No. 1 Apex Pipe Machine.
No. 2 Garvin Tapper.
No. 14 Pratt & Whitney, 2 spindle Profiler.
No. 1 Newton Cold Saw.
No. 5 National Oil Separator.

Stocker-Rumely-Wachs Co.

117-121 North Jefferson Street **Chicago, Illinois**

Machines We Own—For Immediate Delivery

6—New Cleveland, 2 spindle, high speed, ball bearing Sensitive Drills
2—New Cleveland 4 spindle high speed, ball bearing Sensitive Drills
4—New No. 5—20" Buffalo Stationary Head, back geared Drills
1—New 21" Cleveland Upright back geared, power feed drill
3—New Cleveland 25" sliding head, back geared power feed drills
1—New 28" Cleveland high speed upright drill, with tapping attachment
1—New 32" Cleveland, upright sliding head
24—New 20th Century Filing Machines
1—New Cleveland Profile Grinder, motor driven
4—New Greenfield Universal Tool and Cutter Grinders
2—New No. 190 Wells Universal Tool and Cutter Grinders
1—No. 60 Heald Cylinder Grinder
4—New No. 1 La Salle Plain and Surface Grinders, micrometer adjustment
1—Used 36" Fellows Gear Shaper
1—Used No. 2 Knowles Keyseater
2—New 12" x 5' Cleveland Toolroom Precision Lathes, complete equipment
3—New 16" x 6' Cleveland Toolroom Lathes, complete equipment
2—New 16" x 6' Cleveland quick change Engine Lathes, regular equipment
1—New 17" x 8' National quick change Engine Lathe
1—Used 24" Libby Turret Lathe
1—New No. 2 Garvin Universal Milling Machine
1—Used No. 5 Cincinnati Plain Milling Machine, quick change feeds, in A-1 condition
1—New No. 2 Marvel Draw Cut Hack Saw with swivel vise
1—New No. 1 Chicago Automatic
1—New Grand Rapids Universal Tool and Cutter Grinder
1—Used 6' Bickford Radial Drill, gear box drive, very good condition
1—New No. 2 Garvin Universal Milling Machine
1—New No. 2½ Rockford Universal Milling Machine
4—New Adams Farwell No. 1 Gear Hobbers
1—Used 1¾" Gridley multiple spindle automatic, arranged for motor drive, but without motor
1—Used No. 2 LeBlond Universal Milling Machine, fine condition
1—New 20" Canedy-Otto Drill Press
2—New Cleveland Single Spindle Sensitive Drills
4—New Cleveland Three Spindle Sensitive Drills
1—24" x 24" x 5' Morse Planer, one head
1—16" Smith & Mills Crank Shaper
1—No. 13 Garvin Plain Miller
1—No. 6 Becker-Lincoln Type Miller
1—No. 1½ Cincinnati Universal Miller
1—No. 1½ Landis Internal Grinder
1—16" x 8' Lodge & Shipley patent head Engine Lathe, including Universal Chuck
1—24" x 12" Schumacher & Boye Engine Lathe
1—3½" x 84" Fitchburg Lo-swing Lathe, all geared heads, single pulley drive, quick change feed

Partial List of Machines Listed with Us for Sale

BORING MACHINES—VERTICAL

1—New Bullard, 24" New Era, with 4 jaw chuck
1—34" Gisholt, turret head
1—38" Bausch & Harris, 2 swivel heads
1—40" King, 2 swivel heads
1—42" Bullard, 2 swivel heads, quick change feed
1—60" Bickford, 2 swivel heads
1—64" Rogers, 2 Swivel heads, single pulley drive
1—8' Bickford, 2 swivel heads, equal to new
1—96" Vertical cylinder boring machine, good as new
1—10' Niles, 2 swivel heads
1—New 14' Niles pattern, 2 swivel heads

BORING MACHINES—HORIZONTAL

1—New Cleveland, 2½" bar
1—No. 2 Rockford, with special large table, good as new
1—No. 3 Lucas, very fine condition
1—Detrich & Harvey, floor type, all geared feeds, universal table, 3½" bar
1—Niles knee type, all geared feeds

BULLDOZERS

1—No. 2 Williams & White, 16" stroke
1—No. 5 Williams & White, 13" stroke
1—No. 23 Williams & White, belt driven
1—Williams & White, 18" stroke
1—No. 137 Ajax Bulldozer
1—No. 29-U Williams & White, weight about 100,000 pounds

CRANES—TRAVELING

1—10 ton Whiting, 37', 3" span, 2 motors
1—New 10 ton, 3 motor type case, 40' span, 220 volt D.C.
1—20 ton Niles, 75' span
1—25 ton Case, 28' span
1—Single leg, 4 motor Gantry Crane

CRANES—LOCOMOTIVE

1—15 ton McMyler, 8 wheel, 42' boom
1—20 ton Brown Hoist, 8 wheel, 40' boom bucket

DRILLING MACHINES—RADIAL

2—New 3½' Morris, single pulley drive
1—New 3½' Cincinnati Bickford, single pulley drive, immediate delivery
3—New 4' Gang single pulley drive
1—4' Cincinnati Bickford Plain, all gear drive
1—New 5' Dresses Plain, July delivery
1—5' Bickford Plain, arranged for variable speed motor
1—5' American Full Universal, gear box drive
1—6' Bickford, motor driven, 7½ H.P., 220 volt D.C. motor
5—6' Reed Prentice, heavy duty, ball bearing
1—No. 10 Prentice, 7' arm, Universal table, motor driven

DRILLING MACHINES—HEAVY DUTY

10—Moline Hole Hogs, heavy duty, 2½" capacity
18—No. 310 Baker
1—No. 23 Foote-Burt
1—No. 24 Foote-Burt

DRILLING MACHINES—SLIDING HEAD

1—26" Barnes sliding head Gang Drill, with 4 spindles, weight about 6000 lbs.
1—New 28" Sibley
1—32" Cincinnati Bickford
2—34" Barnes

GEAR CUTTING MACHINES

4—New No. 1 Adams Farwell Gear Hobber
1—No. 2-A Newark, 24" x 8" capacity
1—15" Gleason Bevel Gear Generator
1—36" Fellows Gear Shaper
1—No. 4 Brown & Sharpe, capacity 48", latest type, equal to new
1—New 4-A Cincinnati, capacity 48" x 12"
1—New No. 5 Lees-Bradner Gear Generator, 14" swing, full universal
1—New 36" Goss Automatic Gear Hobber, immediate delivery
1—New 40" Flather Gear Cutter, immediate delivery

GRINDERS—CYLINDRICAL—PLAIN

2—New Modern 8 x 30, self-contained
2—New 12 x 24 Modern, self-contained
4—New Modern, self-contained, capacity 12" x 48"
1—12" x 48" Queen City
1—14" x 66" Landis
1—No. 21 Landis, capacity 10 x 30

GRINDERS—CYLINDRICAL—UNIVERSAL

1—New No. 1—10" x 30" Webster & Perks
1—New No. 3 Modern, capacity 13" x 40"
1—New Landis No. 3, capacity 12" x 42"
1—No. 5 Brown & Sharpe, capacity 22" x 72"

GRINDERS—INTERNAL

1—No. 2½ Bath Duplex
1—New No. 70 Heald, immediate delivery
1—No. 70 Heald, very good condition

GRINDERS—SURFACE

2—Walker, single stroke, good as new
1—New No. 1 Wilmarth & Morman
1—New No. 3 Wilmarth & Morman, immediate delivery
2—3' Pratt & Whitney vertical
1—Blanchard, 16" wheel, 24" magnetic chuck

HAMMERS—POWER

1—New Williams & White, 40 lb. Yeakley
2—New Williams & White, 650 lb. Yeakley
2—800 pound Bliss, board drop
1—1200 pound Billings & Spencer, board drop
1—1500 pound Lennox

HAMMERS—STEAM

1—700 pound Bement, single frame
1—1100 pound Pittsburgh, single frame
1—New 1100 pound Morgan, single frame
1—New 2000 pound Morgan, single frame
1—3000 pound Morgan, double frame
1—New 6500 pound Massillon
1—7000 pound Morgan

KEYSEATERS

1—No. 1 Baker
1—No. 2 Little Giant, 13" stroke
1—No. 5 Colburn, 43" stroke

LATHES—ENGINE

10—New 16 x 8 Cincinnati, quick change, double back Engine Lathes, immediate delivery
1—18" x 18' Lodge & Shipley, quick change, good as new
1—24" x 16' Lodge & Shipley
1—30" x 28' Flather, double back geared, quick change
1—New 32" x 18' Bridgeford
1—32" x 24' Fay & Scott
1—42" x 20' New Haven, triple geared, face plate drive
1—51" x 18' Fifield, triple geared, face plate drive
1—60" x 28' New Haven, triple geared, fine condition
1—New 60" x 30' Fifield, triple geared, immediate delivery
1—90" x 20' Pond, face plate drive

LATHES—TURRET

2—21" Gisholt, 18" chuck, quick traverse, taper attachment
2—2 x 24 Jones & Lamson
1—3 x 36 Jones & Lamson, single pulley drive
18—6-A Potter & Johnson
1—3-A Warner & Swasey hollow hexagon, bar and chucking equipment

MILLING MACHINES—KNEE TYPE UNIVERSAL

1—New No. 1 Cincinnati
1—No. 2 Milwaukee, all geared head, single pulley drive, as good as new
1—New No. 2 Kempsmith
2—New No. 3 Kempsmith
1—New No. 3-A Garvin
1—New No. 4 LeBlond

MILLING MACHINES—KNEE TYPE PLAIN

5—New Gooley & Edlund, type "A" Briggs
6—New No. 1½ American
1—New No. 2 Kempsmith
1—No. 3 LeBlond with vertical attachment, modern tool
1—No. 4 Cincinnati, motor driven, first-class condition
1—No. 5 Cincinnati, geared head, single pulley drive
2—New No. 15 Garvin

MILLING MACHINES—VERTICAL

1—No. 2 Cincinnati, single pulley drive
2—New No. 4-"B" Becker
1—No. 5 Becker-Brainard, with rotary table
2—New Garvin No. 15 table, feeds 60"

PLANERS

2—24" x 24" x 6' American, late type, one head
1—26" x 26" x 10' Gray, 1 head
1—New 27" x 27" x 10' Woodward & Powell, 2 heads
1—30" x 30" x 10' Gray, 1 head
3—36" x 36" x 8' Gray, 2 heads
1—36" x 36" x 8' Pond, 2 heads
1—40" x 40" x 8' Pond, 1 heavy swivel head
1—42" x 42" x 12' Hill-Clarke, heavy pattern, 3 heads
1—48" x 48" x 12' Niles, 2 heads on rail
1—52" x 52" x 24' Betz, 1 head
1—60" x 46" x 15' Patch, 4 heads, excellent condition
1—16' Hilles & Jones plate planer
1—18' Hilles & Jones plate planer

PUNCHES AND SHEARS

1—Alligator Shear, capacity 5" in soft steel
1—No. 5 Canton Foundry Alligator Shear, capacity 3" square steel, motor driven
1—Bertch Boilermakers Punches, 14" stroke, capacity 1" thru 1", geared type, good as new
1—New Kling, 36" throat, capacity 1¼ thru 1", 90 day delivery
1—New Beaty single end punch and shear, 42" throat, capacity 1¼" thru 1", 90 days delivery
2—New Beatty single end punch and shear, 48" throat, capacity 1" thru 1", 90 days delivery
1—66" Queen City, capacity 4" thru 1" or 2" thru 2", weight 53,000 lbs., immediate delivery

ROLLS

1—Set Stacy 8' Bending Roll, ¾" plate capacity
1—Set 10' Niles, capacity ⅝ to ½"
1—Set 14' Hilles & Jones, capacity ½" plate

SCREW MACHINES—AUTOMATIC

7—⅜" Gridley, multi spindle, arranged for motor drive
1—1¾" Gridley, multi spindle, good as new
20—1¼" Gridley, single spindle
1—No. 0 Brown & Sharpe
1—No. 00 Brown & Sharpe
1—No. 2 "G" Brown & Sharpe

SHAPERS

3—New 18" Hollingsworth
2—New 20" Steptoe, improved single geared crank
6—New 24" Hollingsworth, triple back geared
1—New 25" Smith & Mills crank
1—30" x 96" Cincinnati, heavy duty, openside shaper, excellent condition
1—New 32" Cincinnati
1—36" Motor Draw Cut

SLOTTERS

1—9" Sellers, circular table, power feeds
1—New Garvin Die Slotter
1—18" Niles, all power feeds

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WATCH THIS PAGE

MILLERS

New —No. 3 Becker Universal Milling Machine.
New 11—No. 1½ American Plain Milling Machines.
New 2—No. 2 Garvin Universal Milling Machines.
New —No. 1 Kempsmith Milling Machine
Used 2—No. 3 Garvin Hand Millers.
Used 1—3½ Van Norman Duplex Miller.
Used —No. 15 Garvin Plain Miller.

PLANERS

New 5—48"x48"x14' Planers, 4 heads, very heavy.
Used —38"x38"x12'6 Reliabuilt, 3 heads.
Used —52x74x52x24' Betts, two heads.
Used 2—25x25x6' Sellers.
Used —74x52x14' Reliabuilt, two heads.
Used —54x44x13'6 Reliabuilt, two heads on rail, one side head.
Used —38x38x8'6 Reliabuilt Planer, two heads.
Used —54x50x12'6 Reliabuilt, two side heads, two rail heads.
Used —66x52x13'6 Reliabuilt, two heads.
Used —78x52x14' Reliabuilt, two heads.
Used —52x48x10' Pond Planer, one head.

DRILLS

New —4' Dreses Plain Radial Drill.
New —3½' Canedy-Otto Radial No. 51.
New —3½' Canedy-Otto Radial No. 101.
Used —No. 17 Foote-Burt 4 Spindle Gang Drill.
Used —No. 15 Harrington 4 Spindle Gang Drill.
Used —8' Warren Semi-Universal Radial.
Used —5'6 Niles Radial, motor drive, D.C. Motor.
Used —3' Reed-Prentice Plain Radial, single pulley, tapping attach.
Used —24" Prentice, sliding head.
Used —24" Aurora Sliding Head.
Used —3 Spindle Burnham Sensitive.
Used —No. 13 Pratt-Whitney Multiple Spindle Drill.
Used —Rockford Six Spindle Mfg. Type Drill.

LATHES

New 1—14x6 Filsmith Lathe.
New 1—15x6' Sidney Tool Room Lathe.
New 5—25" Sidney Heavy Duty Lathes, 16' to 24'.
Used 1—14x8' Perkins Lathe.
Used 1—18x6' Blaisdell Lathe, raised to 24".
Used 1—14x5 Putnam Lathe.
Used 1—20x8' Pond Lathe.
Used 1—24x10' Harrington Lathe.
Used 1—28x8' Pond Lathe.
Used 2—2½x36" Lodge-Shipley Marvel Lathes Geared Head.
Used 1—30x10' Harrington Lathe.
Used 1—30x10' Pond Lathe.
Used 1—30x14' Pond Lathe.
Used 1—34x10' Pond Lathe, raised to 48".
Used 1—38x16' D. W. Pond Lathe.
Used 1—Large Pitt Lathe, 9' face plate.

GRINDERS

New 11—Premier Tool and Cutter Grinders.
New 1—18" Hoysradt-Case Disc Grinder.
New 1—No. 1 Wilmarth & Morman Surface Grinder.
New 1—Dumore Electric Grinder.
Used 1—No. 2 Walker Universal Grinder.
Used 1—No. 5 Brown-Sharpe Universal Grinder.
Used 1—16x36 Bridgeport Plain Grinder.
Used 1—No. 2 Putnam Tool and Cutter Grinder.
Used 1—12x72 Landis, plain.

AUTOMATICS

Used 3—2" Cleveland Model A Automatics.
Used 1—2¼" Cleveland Automatic.
Used 1—2¼" Gridley Single Spindle Automatic.
Used 1—No. 0 Brown-Sharpe Automatic.

BORING MILLS

New 1—No. 1 Cleveland Horizontal Boring Mill.
New 1—No. 0 Giddings & Lewis Horizontal Boring Mill.
Used 1—Bement Horizontal Boring Mill, knee type, 2½".
Used 1—7' Bickford Vertical Boring Mill, motor drive.

SHAPERS AND SCREW MACHINES

Used 1—20x6 Perkins Turret Lathe.
Used 1—20x8 Bridgeport Turret Lathe.
Used 1—20" Smith-Mills Back Geared Shaper.
Used 5—No. 32½ Garvin Turret Lathes, wire feed, friction head, back geared, power feed to turret, 2⅛" capacity.
Used 20—20"8' Rolsted Turret Lathes.

MISCELLANEOUS

Used 1—10-Ton Bedford Crane, two motor type 40' span.
Used 1—42" Niles Car Wheel Borer.
New 18—Simmons Universal Dividing Heads.

GUARANTEED EXACTLY AS REPRESENTED OR MONEY RETURNED
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Remember we own and have in our Warehouse, Jersey City, every tool we offer.

ENGINE LATHES

60" x 27' New Haven—6 years old—triple geared—face plate drive—3⅝" hollow spindle—weight 28,000 lbs.

26" x 20' New Haven—raising blocks to swing 36"—18'-6" centers—C.R.—P.C.F.

26" x 14' Pond Plainfield Heavy Duty—8'-6" centers—C.R.—P.C.F.

25" x 10' Le Blond Heavy Duty—full quick change—taper attachment—double back geared—5½" belt—50" centers.

24" x 12' Schumacker & Boye—96" centers—C.R.—P.C.F.—cabinet legs, 2¼" hollow spindle.

24" x 10' Carroll-Jameison, NEW Heavy Duty—semi-quick change—3 step cone for 5" belt—5' centers.

19" x 10' Champion—full quick change—double back geared—6'-6" centers—C.R.—P.C.F.

16" x 8' Flather—full quick change—5' centers—1 1/16" hollow spindle—C.R.—P.C.F.

14" x 7' Prentice—54" centers—rod and screw feed—9" 4 jaw chuck.

PULLEY LATHES

42" Putnam—turret boring attachment.

BORING MILLS

64" Rogers Vertical—two heads—table 60" dia.—single pulley drive—quick change gear feed.

38" Niles Vertical Carwheel and Cylinder 40" dia. 3 chuck jaw table—crane attached.

KEYSEATERS

No. 1 Baker Bros.—12"—practically new.

GEAR CUTTERS

36" Brainard Automatic—cuts spur and bevel.

24" Newark Automatic—cuts spur and bevel.

PLANERS AND SHAPERS

33" x 33" x 15' Pond—two heads on cross rail.

24" x 24" x 6' American Heavy Duty—practically new.

16" Hendey Shaper—swivel vise.

MILLING MACHINES

No. 3 Le Blond plain Heavy Duty—practically new—weight 4900 lbs.—rapid change gear feed—double back geared—vertical attachment—dividing heads—vise.

No. 3 Cincinnati Plain—weight about 3000 lbs.—working surface of table 12" x 46"—back geared—vise.

PIPE MACHINES

6" Curtis & Curtis—dies 1" to 6".

2" Eaton, Cole & Burnham—dies ½" to 2".

DRILL PRESSES

26" Bickford High Speed—No. 4 Morse Taper.

24" Prentice B.G. sliding head—No. 4 Morse Taper.

20" Davis B.G.—power feed.

13" Barr Sensitive.

PUNCHES AND SHEARS

No. 11 Badger State Combination Single End Punch and Shear—shear ½" x 6" flat—1¼" round—punch ⅝" through ⅝".

No. P. G. 3 Ferracute—geared—1½" stroke—capacity 1" through ½".

No. 652 Niagara Power Gap Squaring Shear—15" Gap—capacity 52" square—⅛" steel.

No. 13 Pettengell Rotary Shear—60" throat—capacity No. 12 Gauge.

SAWS

No. 15 Lea-Simplex Cold Metal—capacity 5¼" round—5¼" square—cut angles up to 45 degrees.

MISCELLANEOUS

7' Bement Bending Rolls.

5' Bement Hand Bending Rolls.

3" and 4" Drilling and Centering Machines.

2—Power Hack Saws.

Bertolette Machine Tool Co.

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STOCK NOW ON HAND

BOLT CUTTERS AND TAPPER

1—¼" Acme single head bolt cutter with dies and countershaft. Good.

2⅛" Detrick & Harvey bolt cutter with lead screws and gears, automatic head, very good condition.

4-spindle Acme 1⅛" capacity Tapping Machine, very good condition.

DRILLS

30" Cincinnati sliding head, square table, power feed, excellent.

1—4' Bickford Plain Radial gear box drive, tapping attachment, swivel table, very good condition.

Bement heavy drilling and coring machine for heavy forgings and structural work, having capacity to drill up to 20" holes. Is 52" between housings, 8" spindle, 36" feed, first class condition.

GEAR CUTTERS

24" Fellows gear shapers, late model, excellent shape, complete.

No. 3 Brown & Sharpe 26" x 8 x 4 D. P., weight about 3200 lb., very fine shape, late model.

12" x 10" Gould & Eberhardt vertical hobber, cone drive, fine condition.

GRINDERS

P & W Vertical Surface Grinder with 12" cup wheel, table 36 x 10¾", good condition.

1—No. 3 Brown & Sharpe Universal Grinder, belt feed, overhead counter; in good condition.

Bay State 10" round table surface grinder, very good shape, fitted with water guards and power feed.

Landis No. 23 Plain Grinder with new heads for crankshaft grinding, very good condition.

No. 75 Heald Internal Grinder, complete and in fine condition. Extra capacity swing.

LATHES

2—18" x 10 Le Blond belt feed, compound rest, hollow spindle, good condition.

24" x 11' Johnson gear feed, comp. rest, hollow spindle; good condition, complete.

48 x 20' New Haven compound rest, quick change gear Engine Lathe, 12' 4" between centers, back geared, hollow spindle, complete, very fine condition.

MILLING MACHINE

No. 5 Ingersoll combined high-power, knee type production miller, motor driven and in excellent condition, range 59" x 17" x 16". Machine has vertical and horizontal spindle drive, rapid traverse, table top 22½" x 72".

PLANER

54 x 36" x 14' Putnam Planer, two rail heads, table 42" wide, 5" thick, housings 7" face, 36" deep, rail 13" face, 12" deep at center, 7' 6" long, first-class condition, weighs 27,000 lb.

SCREW MACHINES AND AUTOMATICS

No. 6 Brown & Sharpe wire feed screw machine, capacity 1½" x 10", good as new. Full equipment.

Bardons & Oliver No. 6½ Screw Machine, automatic chuck, wire feed, power feeds to turret and cut-off slide, very good.

1—2" x 24" J. & L. with chucking equipment and collet, reverse position; chuck, pump, etc., belt feed, sliding geared head; fine condition.

Nos. 32 and 33 New Britain Automatic Chucking Machines, very good.

6—7" x 14" Potter & Johnson Auto. Chucking Lathes. Good.

TURRET LATHES

26" Davis Turret Lathe with rapid traverse to turret, also has carriage with square swivel tool holder and 4-jaw universal chuck, good condition.

Bullard gap turret lathe, 49" swing, 4-jaw 28" chuck, 36" maximum distance from turret to chuck. All in very good condition.

MISCELLANEOUS

1—No. 2 Baker Keyseater with equipment, very good.

3 Special Hydraulic indexing presses, built to draw cartridge cases for 3" shells up to 18" long. Good as new.

No. 2 Waterbury Farrell rack and pinion press, 25" stroke, weighs about 7500 lb., very good condition.

No. 3 and No. 4 J. N. LaPoint Broaching Machines, latest model, complete, good as new.

THESE TOOLS ARE BOUGHT WITH CARE AND GUARANTEED AS REPRESENTED.

NEW EQUIPMENT

Drill Presses, 20" Silver (12)
Grinder, W. & P. Wet Tool, 18 x 2".
Grinder and Polisher, No. 1¼-T. W. & P.
Lathe, 26" x 14' Sidney, Q.C., D.B.G.
Lathe, 19" x 12' Sidney, Q.C., D.B.G.
Lathe, 19" x 10' Sidney, Q.C., D.B.G.
Lathe, 17" x 10' Sidney, Q.C., D.B.G.
Lathe, 17" x 8' Sidney, Q.C., D.B.G.
Lathe, 15" x 8' Sidney, Q.C., D.B.G.
Lathe, 15" x 6' Sidney, Q.C., S.B.G.
Lathe, 16" x 6' Filsmith, Q.C., D.B.G.
Lathe, 14" x 8' Filsmith, D.B.G.
Lathe, 14" x 6' Filsmith, D.B.G., Q.C., T.A.
Lathe, 18" x 10' Hollingworth, Q.C., S.B.G.
Lathe, 18" x 8' Hollingworth, Q.C., S.B.G.
Lathe Polishing and Buffing, No. 0 W. & P.
Lathe Polishing and Buffing, No. 4 W. & P.
Saws, Peerless, cap. 6 x 6, 9 x 9.
Shapers, 24", 18" and 16" geared, crank.

USED EQUIPMENT

ELECTRIC TRAVELING CRANES

25 ton Case, 28' 1" span, 220 V., D.C.
20 ton Shaw, 55' 10" span, 110-220 V., D.C.
35 ton, 75' span, 220 V., D.C., 4 motor.
5 ton, 40' span, 110 V., D.C., 3 motor.

PRESSES AND BRAKES

No. 3½-C Bliss Toggle, D.B.G.
No. 8 Bliss, 11" stroke, D.B.G.
No. 206-F Toledo, B.G.
No. 225 Adriance, 2" str., 7000 lb. geared.
No. P-5 Ferracute, 1½" str., 8600 lb.
No. 11 Perkins, trim., 4" str., 16000 lb.
No. 65 Special Toledo (Cam drg.) 7 and 4" str.
13' 6" Garrison Brake or Press, cap. ¼".
8' Robinson Hand Brake, cap. 16 ga.

PUNCHES, SHEARS AND ROLLS

Single, 27" tht., cap. ⅝ x ⅝", Q.C.
Single, 9" tht., cap. 1 x ¾", Champ.
Double, 15" tht., cap. ⅜ x ⅜", Fischer.
Double, 15" tht., cap. 1¾ x 1", W-W.
Double, 12" tht., cap. ⅝ x ⅝", Q.C.
Double, 12" blades, bar shear, cap. 2" sq.
Guillotine Shear, cap. 2½" sq., No. 6 Perkins.
Guillotine Shear, cap. 1¼" rds., H. & J.
Guillotine Shear, cap. ⅝ x 17", Fischer M.D.

MOTORS AND GENERATORS

30 H.P., Fairbanks, 3-60-220 V., 900 rev.
30 H.P., Burke, 3-60-220 V., 1800 rev.
20 H.P., Burke, 3-60-220 V., 900 rev.
20 H.P., Fairbanks, 3-60-220 V., 900 rev.
10 H.P., G.E., 3-60-220 V., 900 rev.
15 H.P., G.E., 500 V., D.C., 1200 rev., "CE"
10 H.P., Westg., 500 V., DC, 1250 rev, "M."
12½ K.W., G.E., 125 V., D.C., 1500 rev.
90 K.V.A., Lincoln, 3-60-220 V., 1200 rev.
300 K.W., 250 V., D.C., engine driven.

MISCELLANEOUS

Bulldozers No. 5 and No. 6 Williams-White.
Compressor, 16 x 12" Blake, 1 cyl., belted.
Drill, 8-spindle, No. 11 National, automatic.
Grinder, No. 5 Diamond Wet Tool, 36" wheel.
Hammers, 40, 30 lb. Bradley Helve.
Hammer, steam drop, 1500-lb. Bement.
Jacks, 50, 40, 30, 20, 15 ton.
Lathe, 48" Niles Car Wheel Turning, journal attachment, M.D.
Lathe, 24" x 15' Fifield, cone.
Lathe, 24" x 15' New Haven, H.S., cone.
Lathe, 17" x 8' Le Blond, Q.C., turret on carriage.
Planer, 30" x 30" x 10' American, 1 head.
Radial Drill, 24" Fosdick, plain.
Radial Drill, 3½' Bickford, plain.
Shaper, 48" Morton Draw Cut, M.D.
Shapers, 24" Cincinnati and 24" G. & E.
Thread Roller, ¾" Waterbury-F., dies.

Quick Shipments from Stock.

McCoy-Brandt Machinery Company

Office and Warehouse 210-218 Penn Ave.

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Machine Tools

New and Second-hand

Long experience in the Machine Tool Business enables us to meet your requirements for Machine Tools of every description

Prompt Deliveries
Honest Service

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D. M. Osborne Machinery Co.

NEW LOCATION

Office and Salesroom: 221 St. Clair Ave. N. E.

CLEVELAND, OHIO

LATHES

102" x 32' bed, 21' centers, Triple Geared Engine Lathe, screw cutting, excellent condition. Immediate delivery.

20" x 17', 13' centers, JONES & LAMSON Engine Lathe, screw cutting, full equipment. Guaranteed A-1.

PLANERS, SLAB MILLERS AND MILLING MACHINES

48" x 48" x 12' NILES Planer with two heads on rail.

22" x 22" x 4' 6" NEWTON Slab Miller with Horizontal Arbor.

25" x 25" x 6' INGERSOLL Slab Miller with Horizontal Arbor.

No. 5 BECKER Vertical Miller, arranged for Motor Drive.

BORING AND DRILLING MACHINES

ESPEN-LUCAS Double Spindle Horizontal Boring Machine, 6" diam. bars.

24" BARNES Stationary Head Drill Press.

25" WEIGEL Sliding Head Drill Press.

28" CINCINNATI Sliding Head Drill Press.

CRANES

25 ton, 3 motor Electric Traveling, cab control, 55' 4½" span, lift about 40', motors 500 V. D.C.

8 ton, 40' span Hand Operated Crane, operated from cab attached to end of crane.

7 ton BEDFORD 3 motor Electric, cab controlled, 48' 6" span. Span can be altered to suit requirements. Motors 3 ph., 60 cy., 400 V. Also can be changed to suit requirements.

5 ton READING, Geared Single, I-Beam Hand Traveling Crane, 18' span, 20' lift.

MISCELLANEOUS

No. 4½ S BLISS, Geared, Double Crank Press.

2—Cleveland Geared, Single End Punches, 8" throat.

No. 6 MORTON Keyseater, Cap. 24" x 2" keyseats, complete with lot bars and cutters.

26" MORTON Draw Stroke Shaper, arranged for motor drive.

5—No. 5-A POTTER & JOHNSTON'S.

4" CLEVELAND Automatic Worm Milling Machine.

SHUSTER Foot Power Spruce Cutter.

1—1½" ACME Upsetter and Forging Machine.

2—No. 33 NEW BRITAIN Multiple Spindle Automatic Chucking Machines, complete with tapping attachment.

1—CLAYTON Steam Driven Air Compressor, Duplex, capacity 350 cu. ft.

WE HAVE A LARGE STOCK OF OTHER NEW AND USED MACHINE TOOLS FOR IMMEDIATE DELIVERY.

WE ALSO HAVE A LARGE SUPPLY OF SHAFTING, PULLEYS, PILLOW BLOCKS, HANGERS, BEARINGS.

ALSO HAVE A LARGE STOCK OF USED INSULATED COPPER CABLE FROM 26,000 C.M. TO 300,000 C.M.

Send Us Your Inquiries by Wire, Phone, Mail or Come and See Us

---

THE O'BRIEN MACHINERY CO.

MACHINE TOOLS

LATHES

26—48" x 14' McCabe double spindle lathe, like new.
20" x 12' Lodge & Shipley
18" x 9'-11'-13' Lehmann Lathes
18" x 8' Fitchburg
17" x 8' Porter
16" x 9'-11'-13' Lehmann
16" x 8' Prentice
16" x 8' South Bend (2)
15" x 8' Sebastian
15" x 8' South Bend (2)
15" x 6' Sebastian
16" x 6' South Bend (3)
13" x 6' South Bend (3)
8 assorted sizes turret lathes, Warner & Swasey and Garvin make with and without wire feed.

DRILL PRESSES

4' Mueller plain radial
8 spindle Bausch Multiple Spindle
20" Sibley sliding head, B.G., P.F.
24" Milwaukee sliding head, B.G., P.F. (2)
24" Hamilton, S.H., B.G., P.F.
20" Stationary head, B.G., P.F. (3)
20" Stationary head, Plain (3)

PRESSES

24" throat Bliss Geared Press, weight about 6000 lbs.
2 Ferracute Toggle Joint Coining Presses, one of these presses exerts 650 tons pressure, and the other 500 tons pressure. Weight about 15,000 and 25,000 lbs.
Straight solid back geared press, weight 8500 lbs.
Stiles & Parker inclinable pattern Toggle Joint Press, weight about 3000 lbs.

PLANERS AND SHAPERS

30" x 30" x 8' Sellers, 1 head, Planer
26" x 26" x 6' New York Safety Planer
16" x 16" x 3' New Haven Planer
16" x 16" x 3' Bement Planer with cabinet base
20" Smith & Mills B.G. Crank Shaper
14" Smith & Mills plain crank

MISCELLANEOUS

60" swing, 2½" spindle Sellers horizontal boring mill, 24" x 36" table
2 Espen Lucas Circular Cold Saws, blades 30" diameter, motor driven
44" swing, 8' bed heavy duty metal spinning lathe
48" Bement spur gear cutter
2—50 lb. Justice Belt Hammers
25-50-100 lb. Little Giant Trip Hammers
Bickett Vertical Miller
2—Garvin No. 2 Plain Millers, tables measure 24" x 6"
14" x 6' American Fox Lathe chasing bar compound slide rest, all attachments
6" Curtis & Curtis Pipe Machine
8' Ohl Hand Brake or Forming Machine, heavy pattern
36" Wet Knife Grinder, motor drive, 110 volts

ELECTRIC MOTORS

We have just purchased all of the motors which have been released by the Knickerbocker Ice Co. in all their plants in the Boroughs of Manhattan and Brooklyn, N. Y., due to change in their electrical service. These motors are all direct current of the best makes and in excellent condition, voltages 110 and 220 volt, as per list below.

PLANT NO. 1

No.	Make	H.P.	Volts	Speed
4	Electro Dynamic	7½	110	500
1	General Electric "CVC"	2	115	1100
1	Payne General Electric "CVC"	1	110	900
2	Fairbanks	4	110	350
1	Westinghouse	5	110	1300
2	Hawthorne "CVC"	15	110	925

PLANT NO. 2

No.	Make	H.P.	Volts	Speed
3	General Electric "BR"	35	220	1150
3	General Electric "CVC"	25	220	1200
1	General Electric "DLC"	40	220	1325
6	General Electric "BR"	7½	220	950
2	General Electric "CVC"	7½	220	1500
2	General Electric "CVC"	10	220	650
2	Crocker-Wheeler	1	220	1300
2	General Electric "BR"	5	220	1250
1	General Electric "BR"	15	220	700

PLANT NO. 3

No.	Make	H.P.	Volts	Speed
2	General Electric "CVC"	3	220	1100
1	Westinghouse "S"	10	220	1700
1	Westinghouse "S"	2	220	
1	General Electric "CVC"	4½	220	1500
2	Westinghouse "S"	3	220	450
3	General Electric "CVC"	19	220	1525/1875
3	Westinghouse "SK"	20	220	850
1	General Electric "CVC"	20	220	1050
1	Triumph	25	220	875
1	Westinghouse	1	220	1725
4	Triumph	5	220	1300
2	General Electric "CVC"	7½	220	825
1	General Electric	3	115	1000

PLANT NO. 4

No.	Make	H.P.	Volts	Speed
1	General Electric	3½	230	1100
1	Crocker-Wheeler	5	230	1850
1	Westinghouse "S"	20	230	1700
1	Westinghouse "S"	5	230	1300

The greater portion of these motors are now in our warehouse for immediate delivery. With these motors and our present stock we are in a position to serve you quickly.

THE O'BRIEN MACHINERY CO.

119 NORTH THIRD STREET **PHILADELPHIA, PA.**

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Cable Address
OBRIEN PHILADELPHIA

We Offer for Immediate Shipment From Stock at Chicago and Milwaukee

AIR COMPRESSORS

1—8" x 8" Chicago Pneumatic Tool Co.'s Belt Driven High Speed Air Compressor, single double acting air cylinder, piston displacement, 115 cubic ft., suitable for 100 lb. air pressure.
1—Curtis Pneumatic Machine Co.'s vertical Air Compressor, 16" x 10" x 16", belt drive, piston displacement, 112 cubic ft.

BORING MACHINES

1—LUCAS Horizontal Boring Machine, 4" bar, 8 ft. long, capacity 48" x 96", sq. table, 30" x 60", compound table 36".
1—Binsse Horizontal Boring Machine, 3¼" bar, table 5' long.
1—Universal Boring Machine Co.'s Horizontal Boring Machine, 2½" bar 7' long, capacity 40" x 108".
1—36" BULLARD Universal Boring Mill, 6 hole hexagon turret.
1—60" BICKFORD Vertical Boring Mill, two swivel heads, plain table.

DRILLS

1—Turner Machine Co.'s 30" six-spindle vertical Boring and Chucking machine.
1—36" Aurora Sliding Head; hand and power feed.
1—20" Four-spindle B. F. Barnes Manufacturers type.
1—2½' Prentice plain radio, single pulley gear box drive.
1—2½' American Sensitive radio, stationary table, 36" x 20".
1—4' Universal Radio Drill Co.'s plain radio back geared power feed.
1—5' Prentice plain radio, single pulley gear box drive.
1—2-spindle Moline Hole Hog Drill, capacity to bore 3" cylinders.

GEAR CUTTERS

1—No. 12 Brown & Sharpe Automatic spur gears 12" in diameter, 8" face, 10 diametrical pitch, in cast iron.
1—No. 3 Brown & Sharpe automatic, capacity 26" x 8".
1—No. 3 Brown & Sharpe automatic, capacity 36" x 8".
1—36" Flather Automatic, for spur gears only.

GRINDERS

No. 1 Cincinnati Univ. Cutter and Reamer.
No. 1 Norton Full Univ. Tool and Cutter.
6" x 32" Norton Plain.
No. 3 B. & S. Cutter and Reamer.
4" x 30" P. & W. Auto Sizing.
No. 1 LeBlond Univ. Cutter and Reamer.
No. 2 Bath Univ.
5—New Wisconsin Full Univ. Tools.
No. 1 Gardner Double Disc.
No. 1 Besly Disc.
No. 17 Gardner Pattern Makers Disc.
24" W. F. & John Barnes, Wet.

HAMMERS

1—2500 lb. Chambersburg single framed, steam.
1—No. 25 Bradley Rubber Cushion Helve.

ENGINE LATHES

1—20" x 8' Hamilton, 3-step cone, double back geared head, compound rest, double friction C/S.
1—20" x 12' American (Swings 22½"), geared head, motor driven, including 212 volt D.C. Westinghouse motor.
1—22" x 12' GREAVES & KLUSMAN, 5-step cone, single geared head, dble. friction C/S.
1—24" x 12' Prentice 4-step cone, single geared head, compound rest, dble. friction C/S.
1—24" x 16' Fifield 4 step cone, single geared head, compound rest, T. & L. pulley C/S.
1—36" x 14' Fifield raising blocks to swing 40", 5-step cone, triple geared head, comp. rest, double fric. C/S. Has crankshaft equip.
1—36" x 14' Bradford with raising blocks to swing 50", 5-step cone, single geared head, driven by 4" belt, thru double fric. C/S, comp. rest, 2" hollow spindle, plain screw cutting.
1—36"-38" x 20' New Haven, 5-step cone, single geared head, double friction C/S, compound rest.
1—23" x 7' Cincinnati Pulley Machinery Co.'s special shell lathe, 2-step cone, for 5½" belt, two carriages on front way, 1 carriage on back way, 33 inches between centers, capacity for 4½" shells. (New machine.)

PLANERS

1—26" x 24" x 6' Gleason, one swivel head on rail, power cross feed, rack and pinion drive T & L C/S.
1—30" x 30" x 8' Whitcomb, one swivel head on rail, single T & L C/S.
1—30" x 30" x 8' Pond, one swivel head on rail, right angle drive, T & L C/S.
1—32" x 32" x 8' Niles, 2 heads on rail, worm drive, T & L pulley C/S.
1—36" x 36" x 16' Ohio, one head on rail, and one side head, C/S.
1—42" x 42" x 8' Whitcomb, one swivel head on rail, right angle drive, single T & L C/S.

SCREW MACHINES

1—1" Cleveland Auto. jigger feed.
1—1¾" Cleveland Auto. fric. feed, 5-hole round turret, C/S, some tool equipment.
1—2" Cleveland Auto. fric. feed, 5-hole turret, C/S, lot of small tools.

TURRET LATHES

1—2" x 24" J & L Flat Turret Lathe, 3-step cone head, triple fric. C/S, auto. chuck.
1—2" x 24" J & L Set Over Type Head for chucking work only. C/S and some equipment.
1—2" x 24" J & L 3-step cone head, bar equipment, C/S.

MISCELLANEOUS

3—No. 7 S.S.P. American Can, Style "M," back geared, straight sided trimming press, stroke 7 inches, die space 23", distance between uprights 25", ratio gearing 7:1.
1—6" x 6" x ½" New Doty double angle shear (new machine.)
1—Kling Bros. Geared punch and riveter, with 31" throat, 12" round stake, capacity 1" x 1".
1—Corrugating and Forming Machine, three steel rolls 7" in dia., 36" long.

AN EXCEPTIONALLY FINE LOT OF MACHINES

E. L. ESSLEY · MACHINERY · Co.

555-557 WASHINGTON BLVD. CHICAGO

Here's Your Opportunity to Secure Immediately these Machine Tools

We can make Shipment from Stock of the following Machines:

BORING MILLS

12' Niles, 2 heads
50" Sellers, 2 heads

PLANERS

26" x 26" x 8' Hamilton, 2 heads
36" x 36" x 8' Pond, 2 heads
36" x 36" x 8' Gray, 2 heads

SHAPERS

1—16" Gould & Eberhardt Back Geared Shaper
1—17" Smith & Mills Plain Shaper
1—24" Gould & Eberhardt Back Geared

LATHES

1—12" x 5' Rockford Plain Change Gear
2—18" x 8' Rockford, D.B.G.
1—20" x 8' U. S. D.B.G. Quick Change, complete
1—20" x 10' Bullard, Back Geared
1—21" x 13' New Haven, B.G., complete
1—22" x 10' Blaisdell Back Geared
1—24" x 12' Porter Cable, D.B.G., complete
1—24" x 10' Niles Bement Pond, Geared Head, motor driven
1—25" x 16' Blaisdell Back Geared
1—32" x 24' Fay & Scott, D.B.G. Quick Change, complete with raising blocks to swing 53"

TURRET LATHES AND SCREW MACHINES

1—24" Steinle, 6¼" hole in spindle, full equipment
1—24" Steinle, 4" hole in spindle, complete with chuck and full equipment
3—24" Davis Turret Lathes, Back Geared
4—Potter & Johnson Automatic Screw Machines
1—Jones & Lamson Flat Turret Lathe
2—Cleveland Automatic Screw Machines, Model A
1—1½" Warner & Swasey Turret Lathe

DRILL PRESSES

3—Leland-Gifford 3 Spindle, Tapping Attachments
4—20" Silver Plain Drills
4—20" Buffalo Plain Drills
8—20" Buffalo B.G.-P.F. Drills
4—20" Silver B.G.-P.F. Drills
1—20" Excelsior B.G.-P.F. Drill
1—20" Champion B.G.-P.F. Drill
1—24" Aurora Sliding Head, B.G.-P.F.
1—24" Kern Sliding Head, B.G.-P.F.
1—28" Aurora Sliding Head, B.G.-P.F.
1—28" Fitchburg Sliding Head, B.G.-P.F.
3—30" Prentice Sliding Head, B.G.-P.F.
1—40" Aurora Sliding Head, B.G.-P.F.

RADIAL DRILLS

1—32" Universal Co. Plain Radial
1—3' Gang Plain, B.G.
1—4' Mueller Plain

MILLING MACHINES

1—No. 2 Le Blond, full universal, complete
1—No. 3½ Fox Regular, complete
2—Brown & Sharpe Plain Millers, Power Feed

GRINDERS

1—Greenfield Universal Grinder, complete

HAMMERS

1—25 lb. Little Giant
1—50 lb. Little Giant
1—500 lb. Miner & Peck Drop Hammer
1—600 lb. Morgan Steam Hammer
1—900 lb. Williams & White Drop Hammer
1—1000 Waterbury Farrell Drop Hammer
1—1200 lb. Billings & Spencer Drop Hammer

PRESSES

1—C2 Ferracute Inclinable Press
1—No. 3 Rockford Inclinable Press

MISCELLANEOUS

1—Newton Cold Saw, complete with 30 Circular Saw Blades

If you don't see listed the machine tool that you are interested in, write us.
We are in touch with a great many others not listed.

MORTON MACHINERY COMPANY

37 S. WATER STREET PHILADELPHIA, PA.

Equipment for Immediate Delivery

1—20" x 12' B. & S. 4 spindle cylinder Boring Machine.
1—Niles Carwheel Boring Mill, 54" swing, 48" table.
2—Herbrand 4 spindle Gang Drills, complete.
1—Herbrand 6 spindle Gang Drill, complete.
1—Barnes 20" single spindle Drill Press.
1—Baush twelve spindle Multiple Drill.
1—20" x 8' Muller Lathe, back geared hollow spindle.
1—32" x 18' N. Y. Engine Co. triple geared Lathe.
1—24" x 9' Pratt & Whitney Lathe, back geared, screw cutting.
1—New Haven Engine Lathe, 36" x 21' 5" step cone, back geared.
1—Pittsburg Engine Lathe, 26" x 15' 4" step cone, back geared.
1—New Britain Automatic Turret Lathe.
1—30" x 30" x 7' New Haven Planer.
1—30" x 30" x 20' New Haven Planer, one head geared, power feed.
1—54" x 40" x 12' Lincoln Planer, 2 heads on cross rail, 2 side heads.
1—Lodge & Davis Milling Machine, back geared, table 8' x 32".
1—Smith & Garbin No. 3 Miller.
2—No. 3 Mitts & Merrill Keyseaters.
3—Bliss Straight Side Wiring Presses.
4—60½ Bliss Reducing Presses, geared.
1—No. 19 Bliss Press. 1—No. 20 Bliss Press.
1—20" Smith & Mills B.G. Crank Shaper.
1—24" Niles B.G. Crank Shaper.
1—16" Single Crank Shaper, shifting belt.
1—Ajax Forging Roll for reducing bar stock No. 1.
1—8" Ajax Upsetting Machine, geared.
1—No. 1 Williamson Metal Band Saw Machine, capacity 7½".
1—250 lb. Niles-Bement-Pond single frame Steam Hammer.
2—800 lb. Massillon All Steel Steam Drop Hammers.
4—1200 lb. Massillon All Steel Steam Drop Hammers.
1—36" Automatic Planer Knife Grinder.
1—No. 60 Heald Cylinder Grinder.
1—8 x 8" Chicago Pneumatic Tool Co. Air Compressor 8 x 8.
1—Ing.-Serg. Duplex Steam Driven Compound Air Compressor, 526 cu. ft.
1—Norwalk Compound Steam Driven Air Compressor, 1160 cu. ft.
1—Steel Tank 8' diam. x 25' long, thickness shell and heads ⅜".
1—Steel Tank 6' diam. x 30' long ⅜" steel plate.
1—Steel Tank 4' diam. x 16' long, thickness shell heads ⅜".
1—48 x 144" Air Receiver Tank for 125 lbs. pressure.
1—20 ton Elec. Traveling Crane, double 14" I-beam, girder 40' span, 1—25 H.P. Motor A.C., 220 volts, 900 R.P.M., 3 lever clutches to move and hoist on top of crane, New Albany make, with 200' of rails.
6—60,000 lbs. Flat Cars. Good condition.
4—10,000 gallon 50 ton truck Tank Cars with coils and heater valves.

NATIONAL PRODUCTS COMPANY

East Liverpool, Ohio

New Cleveland Automatics

In Stock

Immediate Delivery

10% BELOW LIST PRICES

1—2" Cleveland, Model A, oil feed.

6—2" Clevelands, Model B, oil feed.

2—2"-2½" Clevelands, Model A, oil feed.

3—2¼"-3¼" Clevelands, Model A, oil feed.

4—2¾"-3¾" Clevelands, Model A, oil feed.

1—No. 22 New Britain Chucking.

1—No. 33 New Britain Chucking.

Over 150 NEW MACHINE TOOLS in stock. Others constantly arriving. Send your inquiries

Carpenter & Woodward, Inc.

2571 Woolworth Bldg.
NEW YORK CITY

Sterling Iron & Steel Co.

Lebanon, Pa.

Telephone 84

When you have plants to dismantle let us inspect them and make you a cash offer.

When you have mixed cars of Scrap Iron for sale, give us a chance to quote you prices, before disposing of them.

Machine Tools

2—800 lb. Bliss Board Drop Hammers
1—600 lb. Lane Steam Drop Hammer
1—Bement Horizontal Boring Machine
1—24" x 24" x 6' Bement Planer, two heads
1—12" x 36" Landis Plain Grinder
1—26" x 26" x 6½' Newton Slab Miller
1—26" x 31' 7" Sellers Lathe
1—24" x 10' Pond Lathe
1—10" x 10" Ingersoll Air Compressor
2—2-ton Hand Traveling Cranes
1—4-spindle Die Sinker.

WICKES MACHINERY CO.
Jersey City, N. J.

FOLLOWING used Machines, immediate delivery, subject to prior sale. Machines in good running condition and can be inspected in our plant.

One Lincoln Type Milling Machine.
One Cincinnati, Plain No. 4 Miller.
One Hand Miller.
One Nults & Merrill Key Seater.
One 18"x8' Engine Lathe.
Two two-spindle Sensitive Drills.
One 16" Kelly Shaper.
Two B & S Gear Cutters.

The Gramm-Bernstein Motor Truck Co., Lima, Ohio.

For Quick Sale

In A1 Condition

1—"Reed Prentice" Vert. wet surface GRINDER with 2 magnetic chucks and spare grinding wheels.
6—"Townsend" No. 2 RIVETTERS.
2—"Valley City" No. 1½ Univ. MILLERS (New).
1—"Rockford" 23" Staty. head DRILL (New).
1—"Myers" 14" Sensitive DRILL (New).
TWIST DRILLS, Lathe and Drill CHUCKS, FILES, Hacksaw BLADES and all small tools and MACHINE TOOLS.

WELBORNE & CO.,
45 Beaver Street, New York

Rebuilt and Guaranteed

IMMEDIATE DELIVERY

LATHES

30"-40" x 22' New Haven
24" x 10' Lodge & Shipley Q. C. G.
20" x 8' Putnam
20" x 8' Perkins
18" x 10' Reed
18" x 8' Schumacher & Boye Q. C. G.
18" x 6' Flather
(2) 19" 8' LeBlond
18" x 8' Blaisdell
18" x 8' Pond
18" x 6' Pond
16" x 6' Lodge & Davis
(2) 17" x 6' Johnson
16" x 6' Flather C. R.
16" x 6' Lodge & Shipley Q. C. G.
14" x 6' LeBlond
(2) 17" x 6' Johnson
16" x 6' Flather C. R.
14" x 6' LeBlond
And many others.

TURRET LATHES

(2) 7" x 14" Potter & Johnson Semi-Automatic
3" x 28" Lodge & Shipley Chucking Lathe
27" Chucking Lathe
2" x 24" Jones & Lamson Flat Turret

DRILL PRESSES

Large Stock. All Sizes.

MILLING MACHINES

48" x 10' 6" Newton Vert. and Horiz.
No. 2A Kempsmith
(2) No. 15 Garvin
22" x 5' Ingersoll Slab
Franklin Slab Miller

PLANERS

38" x 10' Aldrich
31" x 31" x 8' Hewes & Phillips
32" x 8' Gleason

BOILERMAKER'S MACHINERY

No. 20 Cady Punch 24" throat
Large lot of miscellaneous ironworkers' tools, punches, etc., etc.

PUNCH PRESSES

No. 52 Toledo
9" stroke B. G. Arch
(4) 8" B. G. Arch
No. 1½ Bliss Arch D. A. 6" stroke B. G.
3" stroke Waterbury Farrell Horiz. D. A.
3½" adj. stroke
2½" stroke D. A. Open Back
1½" stroke Waterbury Farrell D. A. Open Back
(2) 1" stroke D. A. Adj. head
1" stroke solid back
1" stroke Perkins Vert.
1" stroke Aikens Allen Geared Arch
No. 2 Foot Power Adj. stroke

SHAPERS

24" Gould & Eberhardt Crank
14" Hendey

MISCELLANEOUS

38" Double Spindle Beaman & Smith Adj. Head Boring Mill
32" Rodgers & Hemphill Vert. Boring Mill
(2) No. 17 Besly Disc Grinders
Heald Univ. Tool Room Grinders
54" x 10½" Diamond Roll Grinder
18" Baylon Disc Grinder
16" Springfield Oil Separator
No. 2 Newton Bar Cold Saw Cutting Off Machine
60" Henley Pulley Lathe
1½ x 18 Morrow Keyseater
Heald Univ. Tool Room Grinder
54" x 10½" Diamond Roll Grinder.
(4) Saw Sharpeners

AIR COMPRESSORS

10" x 16" x 18" Laidlaw Dunn Duplex
14" x 9" x 8" Ingersoll Two Stage
8" x 12" x 8" Cox Duplex
8" x 12" x 8" Ingersoll-Rand, Self Oiling
Many Others—Belt and Steam Driven

BOILERS

60" x 12' H. R. T. 125 lbs. steam.

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Large Stock. All Sizes.

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Large Stock Pressure, Tank and Vacuum—all sizes for every duty

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6x48 Pratt & Whitney plain grinder.

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5—10x36 Norton grinders.

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No. 12-26 Besly grinder.

12x60 Landis Universal grinder.

3—16x6 Hendey geared head lathes.

2—16" American back geared shapers, swivel knee tilting table.

48x6 Springfield planer type grinder.

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Quick Action

You can be assured of quick shipment of any machine on this list.
This material has been carefully selected. Our engineers are specialists and will assist in fitting any item to meet the conditions in your plant.

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976-B	Rand 8 x 8 x 8, cu.ft.
824-B	Bury 8 x 8, 69 cu.ft.
1028-C	Ingersoll-Rand, 2 stage, 10¼ x 16¼ x 16, 700 cu.ft.
791-D	Ingersoll-Sargent, 2 stage, 22¼ x 14½ x 14, 841 cu.ft.

COMPRESSORS (Steam Driven)

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110-E	Ingersoll-Rand, 12 x 14 x 18, 400 cu.ft.
105A	Sargent "A," 18 x 18¼ x 24, 656 cu.ft.
118-H	Laidlaw-Dunn-Gordon, 16 x 18 x 18, 525 cu.ft.
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These are only a few of the belted and steam driven compressors which we can furnish—Write for further data.

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978	75 hp. Heine, 165-lb. pressure.
281-A	90 hp. Scotch Marine, 125-lb. pressure.
194	100 hp. HRT, 120-lb. pressure.
535	100 hp. HRT, 125-lb. pressure.
991	(4) 100 hp. Ames, 110-lb. pressure.
58-61	(4) 100 hp. HRT, 80- to 100-lb. pressure.
332	(5) 150 hp. Heine, 150-lb. pressure.
333	(4) 150 hp. HRT, 125-lb. pressure.
482	(1) 225 hp. Scotch Marine, 125-lb. pressure.
R1	(4) 250 hp. Stirling, 145-lb. pressure.
331	(7) 264 hp. B. & W., 160-lb. pressure.
R11	(1) 500 hp. Stirling, 175-lb. pressure.

OIL ENGINES

1007	11 hp. De La Vergne.
1010	15 hp. De La Vergne.
673	25 hp. De La Vergne.
1080	20 hp. De La Vergne.
	25 hp. De La Vergne.
	32 hp. De La Vergne.
1002	35 hp. De La Vergne.
992	50 hp. De La Vergne belted to 30 KW. generator.
1006	70 hp. Twin De La Vergne.
999	100 hp. Type H.A., Twin Cylinder.
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668	170 hp. Twin F. H. De La Vergne.
1061	200 hp. Twin FH De La Vergne.
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	(1) 125 hp. American Diesel direct connected to 100 kva. Fort Wayne, 60-cycle, 3-phase alternator, in fine shape, complete installation.
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	50 hp. Alberger Gas Engine.
259	50 hp. Fairbanks-Morse.
232	60 hp. Nash.
658	100 hp. Bruce-Macbeth.
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	160 hp. Turner-Frick.
	160 hp. Otto.
	300 hp. Rathbun-Jones.

GAS PRODUCERS

110-G	50 hp. Smith Type E.
1099	100 hp. Westinghouse.
866	125 hp. Smith.
929	175 hp. Smith.
873	240 hp. Wood.
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310-A	45-kw., 220-volt, D.C.
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1—No. 2-A Fox Universal Milling Machine, new.
1—No. 25 Bilton Back Geared Plain Milling Machine, new.
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1—No. 3 Adams Hand Screw Press.
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1—200 lbs. Standard Plain Drop Hammer.
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MISCELLANEOUS.

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1—6 x 10 Roller Bearing Rolling Mill.
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1—No. 2 Southworth Plain Head Wire Feed Screw Machine.
1—No. 2 Standard Drawing and Broaching Press.
1—6" H & B Cutting-off Machine accelerated speed type.
1—No. 1 Newton Cold Saw Cutting-off Machine.
1—No. 3-A 36 x 10 Cincinnati Automatic Gear Cutter, new.

LATHES.

1—12 x 5 Reed Engine Lathe, R & F.
1—16 x 6 Flather Engine Lathe, QCG, new.
2—18 x 8 Rockford Engine Lathes, QCG, new.
1—24 x 12 Providence Engine Lathe, new.
1—24" Gisholt Turret Lathe.
1—16 x 8 Draper Engine Lathe, CR, QCG, Taper.
1—16 x 8 Prentice Engine Lathe, 5-step cone, CR, Draw in Attachment.

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1—14" Excelsior Drill, new.
1—21" Providence Ball Bearing Zepplin Upright Drill.
2—2-Spindle Allen BB Upright Drills, new.
2—4-Spindle Allen BB Upright Drills, new.
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1—6" Bausch Radial Drill, new.
1—3' Taylor & Fenn Sensitive Radial Drill, new.

PLANERS AND SHAPERS.

1—16" Smith & Mills Single Gear Shaper.
3—24 x 24 x 6' Powell Extra Heavy Hy-Speed Planers, one head new.
1—27 x 27 x 8' Woodward & Powell Planer, one head new.
6—30 x 30 x 10' Powell Standard Planers, two heads (June delivery).
1—16" Davis Back Geared Shaper, new.
1—15" Potter & Johnston Shaper, new.
1—24" Potter & Johnston Shaper, new.
1—12" Smith & Mills Single Gear Shaper, new.

GRINDERS.

3—10 x 30 Landis Plain Grinders.
1—No. 11 Atlas Plain Grinder.
2—No. 1 Morse Universal Grinders.
2—Greenfield Universal Cutter & Reamer Grinders, new.
1—No. 1 Norton Universal Tool & Cutter Grinder, new.
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1—20" Baylon Double Combination Disc Grinder.

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A Few Special Tools

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Desirable Used Tools
Immediate Delivery

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20" SILVER, w. and l. feed (2).
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26" AURORA, sliding head, belted power feed.
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24" FELLOWS gear shaper, belt driven.
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No. 2 CINCINNATI plain.
No. 2 CINCINNATI universal, 10" univ. div. head.
No. 3 CINCINNATI plain.

PLANERS

30 x 30 x 6' GRAY, one head.

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C-2 FERRACUTE o.b.i. press, also C-3.
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HARTFORD ¼" automatic screw machines (2).
WARNER & SWASEY 16" Fox turret lathe.
AMERICAN 16" x 6' Fox turret lathe, univ, round turret.
BARDONS & OLIVER No. 1, ⅝" hand screw machine, auto.
2¼" WARNER & SWASEY screw machine, g.f.h., p.r.
No. 2, 1" SOUTHWORTH turret screw machine.
No. 4, 1½" SOUTHWORTH turret screw machine, f.g.h., p.f. to turret.

MISCELLANEOUS

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60-lb. BRADLEY hor. helve hammer.

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1—42" Bayley Floor Type Ventilating Fan

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1—21" Hoefer 3 sp., w. and l. and h.p.f. Driller
1—25" Aurora b.g. s.h. Driller with t.a.

GRINDERS

1—No. 1½ Cincinnati Universal Tool and Cutting Grinder
1—10 x 30" Landis Grinder
1—No. 1½ S-U Willey Center Grinder without h.f., 110 v. A.C. or D.C.
1—16" Whitney Scraper Knife Grinder
1—No. 2 Brown & Sharpe Universal Grinder

HACK SAWS

1—No. 1 Marvel Hack Saw
1—No. 7 Racine High Speed Hack Saw

LATHES

2—No. 30-P—11" x 5' Star Foot Power Lathes
1—13" x 8' South Bend Screw Cutting Engine Lathe
1—14" x 8' American 4 st.c., s.b.g., std. Lathe
1—16" x 8' South Bend Screw Cutting Engine Lathe
1—16" x 8' loose change gear, 3 st.c., d.b.g. lathe
1—16" x 8' Flather, b.g., q.c. lathe, with t.a.
1—16" x 8' Schellenbach 3 st.c., d.b.g., q.c. lathe
1—18" x 10' Blaisdell 3 st.c., s.b.g., std. lathe
1—22" x 10' Pond 4 st.c., s.b.g., std. lathe

TURRET LATHES

1—1⅜" cap. Davis & Egan Turret Lathe
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MISCELLANEOUS

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1—No. 1 Stewart Oven Furnace with blower, for mfg. gas
1—36" Power Gap Shears
1—36" x 72" Air Tank for 200 lb. pressure
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1—Type B Lourie Special Power Arbor Press
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1—Diamond Speed Lathe, 10 in. x 4 ft.
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1—Acme Machine Co.'s 10 in. Single Spindle Drill Press.
1—Barnes 28 in. Single Spindle Upright Drill Press.
1—Armour & Littledale 10 in. Single Spindle Drill Press.
1—20 in. Aurora Single Spindle Drill Press.
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5—Avey Drill Presses—2 Spindle.
3—Avey Drill Presses—3 Spindle.
1—Langelier High Speed Drill Press No. 1.

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28—No. 6A "Potter & Johnson" Automatic Turning Machines; 9 are motor driven.

MILLING MACHINES

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1—Diamond Machine Co.'s 12-in. Face and Angle Grinder.
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1—2 in. Plain Cleveland Automatic Single Spindle and Screw Machine.
7—Foster Screw Machines No. 4.
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MISCELLANEOUS MACHINERY

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1—No. 1 Garvin Automatic Tapping Machine.
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Capacity 250 Kva., 11000/230 Volt, 3 Phase, 25 Cycle, as follows:
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MISCELLANEOUS

2105 feet of 7" 15 lb. I-Beam in lengths of 10 ft. to 30 ft.
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30" Bullard vertical, turret head, chuck jaws, belt feed.
Four spindle Moline-Beaman & Smith cylinder borer.

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13" x 6' American, plain change gears.
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24" x 12' Reed, compound rest.
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84" Putnam driving wheel lathe.

PLANERS

36" x 36" x 8' Niles, one rail head, one side head.
36" x 36" x 10' Whitcomb, one head.

MISCELLANEOUS

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48", 200 ton Niles hydraulic wheel press.
2" Jarecki pipe machine.
1⅝" Pearson back geared screw machine, power feed turret.

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from the

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1—Long & Allstatter Combination Shear and Bevel Machine.
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1—60" Horizontal Cylinder Borer, being fitted with 9" bar, 3 facing heads, side adjustment 24", will bore cylinder to 10' long; very heavy tool in fine condition.
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1—35" x 18' New Haven Lathe, compound rest, power cross feed, 5 step cone, fine condition.
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1—18' x 8' Reed Lathe.
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Large stock of smaller sizes.
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1—Morton Keyseater.
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1—24" Prentiss Drill Press, sliding head, power feed, back geared.
1—700 lb. Bement Steam Hammer.
1—75 lb. Belden Hammer.
Smaller hammer for immediate delivery.
1—Set of Plate Bending Rolls, 8' 6" between housings, each 12" in diameter, solid housings.
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1—No. 54 Farrell Stamping Press.
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1—30 H.P. Locomotive Boiler, 100 lb. W.P.
1—10 x 10 x 9 Clayton Air Compressor.
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15"x7' P. & W. Speed.
16"x8' Q.C. Von Wyck.

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⅜" 4-spind. old style Acme Automatic.
½" Spencer single turret Automatic.
2"x24" Jones & Lamson, Cone Head.
24" Size I Gisholt, 220 V., D.C.M.D.
28" Milwaukee Turret Lathe.

PLANERS

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24"x24"x8' P & W.
30"x30"x6' Pond, 2 hds.
30"x30"x8' Pond, 2 hds.
30"x30"x10' Pond, 2 hds.
30"x30"x14' P & W, 1 hd.

DRILLING AND BORING MACHINES

60" Niles Goosneck Drill.
14" 4-spindle Turret Drill.
17" 4-spindle Gang Drill.
No. 5 Dallet Portable Drill.
3' Grant Radial Drill and Boring Mch.
5' Niles Semi-Univ. Radial, old style.
6' Niles Semi-Univ. Radial, old style.
2" spind. old style hor. B. & D. Mch.

MISCELLANEOUS

Crane, 20-ton, 41' span, 3 motor, 320 V.D.C.
Gear Cutter, 24" Spur & Bevel, Newark.
Gear Cutter, 42" spur, Bement.
Gear Planer, 42" bevel, Gleason old style.
Grindstone, 34" Cleveland.
Grinder, wet, saw No. 1 Tindel.
Grinder, No. 1 Cutter Cincinnati.
Grinder, wet, Double 24" Cup wheels.
No. 4 12x66 Landis Univ. Grinder.
Miller, No. 22, Plain Brainerd, B.G., range 29x7¾x20".
Miller, No. 6 P. & W. Slab, table 42" x17".

Niles-Bement-Pond Co.

111 Broadway, NEW YORK

List of Offices and Agencies on page 214

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1 36x36 Betts Heavy Duty Planer with 10' bed. Just the tool for frog and switch work, in excellent working condition. Can be seen in operation.

ADDRESS BOX F-559
care *The Iron Age*, New York

SELLERS 12" Stroke Slotter $2250
Colburn 30" Boring Mill, turret head 2250
Landis 3" Bolt Cutter.... 1400

ADDRESS BOX X-611
care *The Iron Age*, New York

FOR SALE BY

M. Braudy & Sons

Grand Rapids
MICHIGAN

ENGINE LATHES

1—24" Ames—16' bed, solid spindle $600.00
1—13½" Star Tool Co. 5' bed, hollow spindle..... 200.00

DRILL PRESSES

1—18" Barnes Drill Press, slotted base, hand feed.... $60.00
1—20" Barnes Drill Press, power and hand feed, slotted base, back geared, nearly new 100.00
1—20" Barnes Drill Press, hand feed, slotted base.... 75.00
1—10" St. Louis Machine Co. Sensitive Drill, nearly new. 30.00
1—Pratt & Whitney 4 Spindle Drill Press, stationary spindles, 3½" centers..... 75.00

PUNCHES

1—Kling Bros. 9" throat, 1" stroke $250.00
8—No. 102 Bliss Punch Presses, 5" throat, ⅜" stroke, each 125.00
1—"Badger" No. 10½ Combined Punch, Shear and Bender, 6½" throat, ⅜" stroke 200.00

TURRET LATHES

1—Garvin 16" swing, 5' bed, ⅝" hole in spindle.....$175.00
1—Garvin 14" swing, 5' bed, ¾" hole in spindle..... 150.00
1—"Reliance" Foote - Burte Company Single Bolt Cutter, capacity to 1¼", nearly new 250.00
1—Western Electric Company Motor, 35 H.P., 110 volts, 1015 R.P.M., type E-50-B. 400.00
1—G. E. 5 H.P., 220 volts, 60 cycles, nearly new..... 110.00
1—Klem Tilting Table Metal Cutting Band Saw with six extra saws..... 225.00
1—12"x5' Turret Lathe, Lodge & Davis Tool Co, ¾" hole through spindle, 5½" round turret with 6¾" holes 150.00

We also carry a large stock of second-hand wood-working machinery, boilers, engines, pumps, etc.

COLD SAWS

2—No. 2 "Espen-Lucas."
1—No. 15 "Lea-Simplex"

Also have in stock a number of hack saws and metal band saws.

L. F. SEYFERT'S SONS, INC.
437 N. 3d St. Philadelphia

NE Four-Head Southwark Cutting-Off Machine, designed to cut Rounds up to 7" diameter, complete with back gears and pinions, including air cylinder for discharging, bed 12' long.

The Milton Manufacturing Company
Milton, Penna.

We have in stock available for immediate delivery the following new and used machines:

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10—No. 5½ Sloan & Chace Bench Lathes, each equipped with compound slide, 3 speed c/s and all regular equipment
4—15 x 6 Rockford Lathes
2—15 x 8 Rockford Lathes
1— 6 x 30 Dalton, pan bed and legs
2—11 x 5 Worcester Lathe
2—13 x 6 Worcester Lathe
1—13 x 6 W. F. & J. Barnes Lathe
1—14 x 6 Flather Q.C.
1—16 x 6 Worcester
1—24 x 12 Flather Q.C., Dbl.B.G.
1—18 x 8 Hamilton style A Lathe
1—12 x 5 Mulliner Toolroom pan bed, taper, draw-in bar
1—16 x 8 Champion Q.C.G., Dbl.B.G. Lathe
3—16 x 8 Hamilton Q.C.G. Lathes

LATHES (USED)

6—10 x 4 Seneca Falls speed lathe, draw-in bar
1—11 x 5 Reed Lathe, pl. change
1—15 x 6 Sebastian Lathe
1—20 x 10 Wood Light Lathe
1—14 x 5 Draper
1—12 x 6 Davis
8—11 x 3 Blount Speed Lathes

PUNCH PRESSES (NEW)

2—No. 2½ Toledo O.B. inclinable presses, wt. 1750 lbs.
1—25 Niagara arch press (used)
2—Empire inclinable presses, size and type Bliss 19

SHAPERS (NEW)

3—24" Milwaukee B.G.
1—No. 1—7" Horizon, Rhodes crank shaper
1—Nos. 1 and 3 combined vertical and horizon. crank shaper
2—28" B. G. Smith & Mills single pulley drive
1—20" Columbia extra heavy B.G. shaper

SHAPERS (USED)

1—24" B.G. Cincinnati
1—16" Jungst friction shaper

MILLING MACHINES (NEW)

3—U. S. Hand Millers, arbor and vise
1—Standard Hand Miller, power feed
34—Gooley Edland "Briggs" miller style "B"
1—No. 1½ Plain Rockford (geared) with arbor
3—No. 21 Garvin Plain Geared, ea.
2—Fox Universal Millers 2A

MILLING MACHINES (USED)

1—No. 2 Garvin Lincoln Type Miller
1—No. 2 Cincinnati Plain Miller with dividing head

GRINDERS (NEW)

3—No. 2 W & M Automatic Surface Grinders 8½ x 20
2—No. 1 W & M Universal Grinders, power feed
5—No. 190 Wells Tool & Cutter Grinders, complete
2—Greenfield Tool and Cutter Grinders, complete
1—Fraser Grinder No. 1 Universal Convertible
2—20" Taylor & Fenn Water Tool Grinder
1—14" Blount Water Tool Grinder
New Blount Grinders Nos. 1, 2, 3 and 4
New Nos. 1, 2, 2½ Bath Universal Grinders

GRINDERS (USED)

1—No. 1 Cincinnati Tool and Cutter Grinder
1—No. 11 Brown & Sharpe Plain Grinder
1—No. 190 Wells Tool & Cutter Grinder
1—20" Whitney Water Tool Grinder
1—14" Sterling Wet Tool Grinder
1—12 x 36 Brown & Sharpe Plain Cylindrical Grinder

DRILL PRESSES (NEW)

5—15" No. 7 W. F. & J. Barnes Drills
6—20" W. F. & J. Barnes Sq. Base plain L & W feed
2—1 spindle Avey high speed B. B. Bench Drills
1—4 spindle Kern high speed B. B. Drill
3—U. S. Sensitive Drills
1—Sgl. spindle Allen H. S. B. B. Drill
1—6 spindle Cleveland B. B. Drill
1—2 spindle Cleveland B. B. Drill
6—20" Buffalo B. G. Drill No. 5

DRILL PRESSES (USED)

1—Sgl. spindle Sensitive Drill
1—No. 14 Colburn heavy duty
3—2 spindle Sensitive Drills, each
1—2 spindle National Sensitive Press
1—3 spindle National Sensitive Drill Press
1—4 spindle Taylor Fenn Sensitive Drill Press

SCREW MACHINES (NEW)

1—No. 6 Foster GFH Scr. Mch. power feed to tur. 2⅛ cap.
1—1" Pierce Turret Lathe
1—1" Pierce Screw Machine
1—Garvin No. 2 Screw Machine
2—No. 140 Wells Screw Machine

SCREW MACHINES (USED)

6—2¼ Model A Cleveland Automatics
4—2¼-2⅝ Cleveland Automatics
4—2¼" Gridly single spindle auto. scr. mch.
2—3¼" Gridly single spindle auto. mch.
1—2¼" Cleveland automatic scr. mch.
1—2 x 24 Jones & Lamson Turret Screw Machine, 3 step cone, in first-class condition

GEAR CUTTER

1—40 x 10 Flather Gear Cutter (New)
1—No. 6 Fellows Gear Shaper (Used), like new

TAPPING MACHINE (NEW)

1—No. 2-X Garvin Automatic Tapping Machine

MISCELLANEOUS

1—30 x 30 x 8 Wilson Planer, 2 heads (new)
1—36 x 20 x 5 sgl. head Planer
2—No. 0 Giddings & Lewis Hor. Boring Mill
1—16" Moline double spindle Boring Mill (used)
1—Foote-Burt double spindle Boring Mill
2—No. 1 Springfield axle and spindle boring mch. (used)
3—36" Brown & Sharpe Vertical Chucking Mach. (used)
1—No. 14 Globe tumbling barrel (used)
1—Heavy Niagara foot press (used)
1—No. 125 Bliss dbl. crank geared press, bed 20 x 40 3" str.
1—18" Libby turret lathe with bar and chucking equipment (used 2 months, exactly like new)
4—6 x 6 Peerless Hack Saws (new)
1—3 spindle 1½ Acme Bolt Cutter (used), fair condition
1—4 spindle 1½ Acme Bolt Cutter (used), fair condition
5—No. 7 Atkins saws ea. (used)
1—No. 1¾ Walker plain magnetic chuck, 110 V. (new)
2—No. 1 Sterling power H S machines (new) ea.
2—No. 2A Sterling power H S machines (new) ea.
1—No. 1 Garvin Horizontal Tapper (used)
1—No. 4 Greenard Arbor Press
2—No. 3½ Greenard Arbor Presses
3—No. 3 Greenard Arbor Presses
2—No. 2 Greenard Arbor Presses
1—No. 3A Greenard Arbor Press
Several sizes U. S. Electrical Tool Co. portable drills in stock
1—40" Sturtevant dbl. exhauster steel plate, 18" inlet, 14" outlet (good as new)

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BUFFALO SYRACUSE ALBANY

Immediate Delivery

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1—20 x 8 American Lathe, Q.C.G., C.R., H.S., D.B.G.
1—No. 2 Landis Universal Grinder, 12" x 32".
1—No. 2 Newark Spur & Bevel Automatic Gear Cutter.

POWER PRESSES

1—No. 4 Adriance Power Press.
1—No. 16 Bliss Horning Press, adjustable table, 2½" stroke.
1—No. 2 Rockford Inclinable Press, 2" stroke.
6—Nos. 01, 1½ and 2 V. & O. Power Presses.
1—28" Barnes Drill Press, B.G., P.F., Sliding Head.

Hollander Machinery Co., Inc.
3 Howard Street New York, N. Y.

TWO 7-A Potter & Johnston Automatic Chucking and Turning Machines, with 7¾" spindle having 6" bore, geared automatic change speed head, automatic change feed, cross slide, 21" 3-jaw scroll chuck, oil pump and piping, turret oiling arrangement, pan base and countershaft.

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In Stock

Union Geared Scroll Chucks, 6" to 15", new.
2—Allen High Speed Drills, 4 spindle, new.
2—Standard Hand Milling Machines, new.
3—Garvin No. 1 Universal Milling Machines, new.
6—Chicago No. 1 Automatics, new.
6—Chicago No. 2 Automatics, new
6—Chicago No. 4 Automatics, new
6—Chicago Semi-Automatic Threading Machines, new.
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1—Fox Monitor, used.
1—Bridgeport Automatic Thread Cutting Lathe, used.
1—P & A Variable Speed Cutting Off Machine, used.
1—Blaisdell Air Compressor with Relieving Valve, used.

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90 West Street New York City

Williams White 29-U Bulldozer. Immediate delivery.

8 Spindle Adjustable Drill Press, 10-foot table, 1½-inch capacity.

12 Groton Routing Machines.

3-inch Landis Bolt Cutter.

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who need machine tools of any kind can get them from us. We have the largest stock of new and second-hand machines between Boston and New York. You get the machines you want when you want them. Look us up.

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A FULL line of automatic machines for the production of multiple parts from bar stock up to 2 in. in diameter.

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26" x 14' Putnam Heavy Duty Q.C.G., D.B.G.
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30" Furrier Pulley Lathe Double C.R.
20" x 8' Mueller Q.C.G., D.B.G.
15—18" x 8' Simplex Lathes.
16" x 6' Pratt & Whitney taper attachment draw-in spindles and collets.
18" x 8' Springfield Q.C.G., D.B.G.
16" x 8' W. P. Davis Q.C.G.
2—14" x 6' Hendey Q.C.G.
14" x 8' Prentice D.B.G.

MILLING MACHINES.

No. 3 BG Cincinnati Universal
No. 2 BG Cincinnati Universal
No. 2-A BG Garvin Universal
No. 2 Brown & Sharpe Plain
2—No. 21 BG Garvin Plain
2—No. 15 BG Garvin Plain
2—No. 14 BG Garvin Plain
No. 14 ABG Garvin Plain
No. 1½ BG Valley City Plain
8—No. 26 Becker Plain
2—No. 7 Becker Lincoln Type.
3—No. 25 BG Becker Plain
Steptoe Plain
No. 2 Cincinnati Vertical like new

GRINDERS.

No. 2 Brown & Sharpe Universal
No. 4 Cincinnati Universal
10" x 50" Norton Cylindrical Grinder
10" x 42" Landis Cylindrical Grinder
No. 3 W & M Surface Grinder (New)
No. 1 W & M Surface Grinder (New)
No. 1 Grand Rapids Universal (New)
3 spindle Bryant Chucking Grinder
2—Ford Smith Shell Grinders

POWER PRESSES.

No. 6 Consolidated Geared Inclinable
No. 5 Toledo Geared Inclinable
No. 5 Niagara Inclinable
No. 3 Toledo Inclinable
No. 4 Bliss Geared (Stiles pattern)
3—Crosby Straight sided
5—No. 7 American Straight sided B.G.
2—800 Ton Hydraulic Presses.

TURRET & SCREW MACHINES

2" x 24" J & L C D. Equipment
6—3" x 36" J & L Flat turrets
No. 3 Foster Geared friction head
2" Millholland Geared friction head
No. 4 B & O Geared friction head
¾" Cleveland Model C Automatic
½" Cleveland Model B Automatic
¼" Cleveland Model A Automatic
3—No. 2 B & S Full Automatics

DRILLS.

3½ ft. Bickford Radial
32-spindle Fox adjustable
8-spindle Foote Burt Gang
3-spindle Foote Burt Gang

New Jersey Machinery Exchange
23 Mechanic Street
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Pipe Machine

8" "Eaton-Cole & Burnham"—with standard die head, chasers and oil pump.

L. F. SEYFERT'S SONS, INC.
437 N. 3d St. Philadelphia

2½" to 10" Cox Pipe Machine.

P. PETTLER & SON,
Beaver Falls, Penn. Pittsburgh District.

LATHES

24" Davis Chucking Lathe.
26" x 12" Newark C.R.—P. C. F.
36" x 16' Putnam C.R.—P. C. F.
38" x 16' Fifield Triple Geared.
42" x 16' Niles C.R.—P. C. F.
48" x 20' New Haven. Quick Change, C.R.—P. C. F. Power Angular Feed to Compound Rest. Good as new.

PLANERS

36" x 36" x 8' American One Head.
42" x 42" x 12' Woodward Powell, Two Heads.
42" x 42" x 10' Detrick & Harvey Openside Planer. Two heads on cross rail. One side head.
60" x 38" x 12' Rebuilt with Sellers Spiral Drive to Table. Two heads on cross rail. Two side heads.
72" x 72" x 16' Pond. Two heads on cross rail. Arranged to receive two side heads.
84" x 56" x 16' G. A. Gray. Two heads on cross rail. Arranged to receive two side heads.

BORING MACHINES

36" Baush Vertical Boring Mill. Two swivel heads. Geared feeds.
72" Niles Vertical Boring and Turning Mill. Two swivel heads.
Detrick & Harvey Floor Type Boring, Drilling and Milling Machine; 3½" bar.

MILLING MACHINES

No. 1 Kempsmith Plain.
No. 24 Oesterlein Universal. Table 9" x 36".
No. 3 Cincinnati Universal.
No. 4 LeBlond Universal.
Barnes Die Sinker or Profiling Machine. Compound table 9" x 20".

DRILLING MACHINES

Four Spindle Moline Drilling and Boring with Special Size Adjustable Table.
5' Niles Semi-Universal Radial.
Two Spindle Moline Heavy Duty Drilling and Boring Machine.
10 Moline "Hole Hog" Single Spindle, 3" capacity.
Two Spindle Foote Burt Heavy Duty Drilling and Boring Machine.
Four Spindle Niles Heavy Duty Rail Type Working Surface of table 24" x 10' 4".

GRINDERS

No. 60 Heald Cylinder Grinder.
Pratt & Whitney Vertical Surface Grinder.
No. 3 Rivett Internal, with External Attachment.

MISCELLANEOUS

24" Bement Heavy Duty Traveling Head Crank Shaper.
6" Ajax Upsetting, Heading and Forging Machine.
4—No. 0 Brown & Sharpe Automatic Screw Machines. ⅝" capacity.
2—3000 lb. United Foundry & Machine Co. Board Drop Hammers.
No. 2 Double J. N. Lapointe Broaching Machine.
4—Schuchardt & Schutte Tooth Rounding Machines, 18" P. D. capacity.

Day Machinery Company
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WHAT HAVE YOU FOR SALE?

1—64" BETTS HORIZONTAL BORING MILL. 4" BAR.
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1—24" GISHOLT TURRET LATHE.
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1—24/48x10' RAHN-LARMON EXTENSION BED GAP LATHE.
1—No. 3 26" BROWN & SHARPE GEAR CUTTER.
1—DG No. 55 FERRACUTE REDRAWING PRESS.
1—48" SPRINGFIELD VERTICAL SPINDLE SURFACE GRINDER.

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What have you for sale?

E. B. Stickley Machinery Co.
GOEBEL BLDG.
Detroit Michigan

Can Ship Today

* 4—16" x 8 Reed engine lathes, double back.
* 3—18" x 10' Reed engine lathes, double back gear.
* 1—20 x 12 Reed engine lathe, double back gear.
* 1—36" x 16' 6" Putnam engine lathe.
1—90" x 31' massive pattern engine lathe, 21 between centers triple gear, full description upon request.

PLANERS

* 1—26 x 26 x 7 Wheeler planer, one head, power feeds.
* 1—36 x 36 x 8 Niles heavy duty planer, four heads.

SHAPERS AND SLOTTERS

* 1—10" Gould & Eberhardt crank shaper, belt drive.
* 1—22" Ohio shaper, back gear, belt drive.
* 1—28" Hendey friction shaper.
1—24" Niles heavy pattern traveling head shaper.
* 1—24" Bement slotter, power feed, 42" circular table.

DRILL PRESSES

* 1—4' Bickford plate radial drill, single pulley gear, box drive, tapping attachment, plain box table.
* 1—5' 6" Niles plain radial drill, belt drive.

HORIZONTAL BORING MILL

1—No. 0 Detrick & Harvey floor type boring mill universal table 3½" bar.

GRINDERS

* 2—No. 60 Heald grinders, used only a few months.
5—New No. 3 modern universal grinders, capacity 13 x 40.

MISCELLANEOUS

* 1—Acme bolt and pipe machine, capacity bolts 3½", pipe 3".
* 1—Whiting centering machine.

Items marked * can be inspected in operation.

We also purchase high grade new and used machine tools. What have you available?

Laird Machinery Co.
747 Ellicott Square
Buffalo, N. Y.

1—24 inch Bar Mill
1—28 inch Bar Mill
1—18 inch Puddle Mill and Squeezer
1—9 ft. Grinding Pan
1—60 inch Roll Lathe
1—Squaring shear; knives 48" long; capacity ½" plate
1—Squaring shear; knives 50" long; capacity ¼" plate
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1—Single End Long & Allstater Punch and Shear
1—Double End Morgan & Williams Punch and Shear
1—Double End Lambertville Punch and Shear
1—Ryerson Hot Saw
3—No. 7½ Baker Blowers
2—Plate Shear Knife Grinding Machines
1—Horizontal Straightening Machine, capacity 30 inch Beams
1—Wilson Snyder Compound Pressure Pump. Cylinders 19" x 34" x 4½" x 24". Rod packed, bronze water ends, capacity 1600 lbs.
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2—Brownhoist 3 Motor Cranes, 26 ft. 3 inch span, 15 ton capacity
1—Morgan 4 Motor Crane, 67 ft. span, 35 ton and 5 ton auxiliary
Several Small Vertical and Horizontal Steam Engines.
1—150 H.P. Rolling Mill Engine
1—250 H.P. Rolling Mill Engine
1—1500 H.P. Rolling Mill Engine
1—Duplex Compound Blast Furnace Engine
5—Steel Mill Buildings
Six brand new turned and necked 26" x 42" Chilled Sheet Mill Rolls
1—Blooming Mill Live Table
1—Planishing 7000 lbs. Steam Hammer
1—Chambersburg 500 ton Hydraulic Press with 2 Pumps driven by 150 H.P. Motors, Pressure 1500 lbs. square inch
1—1500 H.P. chain drive and mill motor, complete with controllers and transformers. Total weight, 300 tons.

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1—16 x 6 Porter
1—16 x 8 Prentiss
1—26 x 14 Prentiss
1—26 x 16 Bridgeford
1—36 x 22 New Haven

DRILLS

1—20" Barnes All Geared
4—No. ½, 3 Spindle Avey High Speed, Bench Type
1—4 Spindle Leland High Speed
1—4 Spindle Allen High Speed
2—5 ft. Baush Radials
1—6 ft. Baush Radial

GRINDERS

2—No. 23 Brown & Sharpe Cylinders
1—No. 10 Brown & Sharpe Plain
1—No. 6-20 Besly Double Spindle Disc
1—No. 170 Wells Universal Tool and Cutter

MILLING MACHINES

1—No. 0 Bickett Vertical Miller and Profiler
1—No. 6 Whitney Hand
1—No. 2-A Becker Vertical

PRESSES

6—Straight Sided Inclined Gang, 1½" stroke
2—Straight Sided Inclined Gang, 2½" stroke
1—No. 2½ Consolidated Plain Inclinable
1—No. 54½ Perkins Sprue Cutter

MISCELLANEOUS

1—No. 2 Bilton Automatic Gear Cutter
1—24 x 24" x 6 ft. Hamilton Planer
1—No. 11½ Higley Cold Saw
1—No. 7 Bellevue Industrial Furnace for gas
1—No. 40 Connersville Pressure Blower

Vonnegut Machinery Co.

Indianapolis, Indiana

Indiana's Largest Machinery Distributors

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2—Open Hearth Steel Furnaces with ladle and floor cranes and steel casting equipment. Also buildings and accessories. For removal or operation at present site.
Slab Charging Crane, span 41' 10¾", Motors 220 V., D.C.
250-ton Hot Metal Mixer with 25-ton ladle car and 50-ton scale.
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21 cast iron Pressure Tanks tested 250-300 lbs.
100-ton Hydraulic Riveting Machinery (Riveter, Tower, Crane, Accumulator, Pressure Pump).
15-ton Electric Furnace and accessories.
2" Acme Cutting-off Machine.
Structural frame for 12-story building.
Vertical Plate Rolls, capacity 1¾". Motor driven.
22" Sheet Bar Mill, Allis-Chalmers eng., 20"x60".
32" 2-high Blooming Mill and Engine.
Overhead Electric Traveling Cranes.
1—15-ton, top pour, and one ½-ton ladle.
(The foregoing all in good second-hand condition.)
Complete distilling apparatus for benzol and toluol with specially designed steel building.
Boiler House, 22' 0" x 28' 10".
G. E. Ind. Motor, Form "I," 600 H.P., 125-95 R.P.M., 6600 V., 3 ph., 25 cy., with panel controllers. Puddle Mill Parts.
Bolt-and-Nut Machinery.

(The four preceding items never used.)

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Good Modern Machine Tools

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Lodge & Shipley 30 x 14 ft. D.C. Engine Lathe
Lodge & Shipley 24 x 12 ft. D.C. motor driven
Lodge & Shipley 18 x 6 ft. Engine Lathes
Reed 24 x 10 ft. Engine Lathes
Draper 16 x 10 ft. Engine Lathes
Chard 18 x 9 ft. Engine Lathes
Davis 18 x 8 ft. Engine Lathes
Rahn Larmon 18 x 6 ft. Engine Lathes
Reed 16 x 6 ft. Engine Lathes
Warner & Swasey Fox-Monitor Turret Lathes
Jones & Lamson 3 x 36 Turret Lathes
Gisholt 21" Turret Lathes
25 Screw Machines, wire feeds
3 Gridley Automatic Lathes
Prentice 48 inch Radial Drill
Alfred Box 60" Radial Drill
Niles 48" Radial Drill
Rogers 40" Ver. Boring Mill, 2 Heads

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Long & Allstatter No. 5 D. E. Punch and Shears
Large D. E. Punch and Shears, 22" throat
1—Toledo heavy geared Power Press
1—Henderson No. 5 geared Power Press
3—Henderson No. 5 Power Presses
1—Ferracute heavy geared Power Press
1—Farrel heavy geared Power Press
1—No. 5½ Bliss double crank Power Press
1—Niagara 60 x 20 D. C. Power Press
25—Bliss No. 18½ Incl. Power Presses, dial feeds
20—Bliss No. 18½ Incl. Power Presses, no dials
30—Brown-Boggs Incl. Presses, dial feeds
Niles 50" Vertical Carwheel Boring Mill
15, 25, 75 lb. Bradley Power Hammers
25, 50, 100 lb. Mayer Power Hammers

JOHN NUTTALL

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New and in Process of Construction

One 3 Motor Electric Traveling Crane, 70 ft. span, 20 ton capacity. Motors A.C., 3 phase, 60 cycle.

Used Machinery

2—100 H.P. Horizontal Boilers.
1— 80 H.P. Horizontal Boiler.
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Machines Used in the Manufacture of 3" Russian Shrapnel

1—Banding Press with hydraulic pump.
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45" x 24' x 17' Centers, New Haven triple geared and geared face plate lathe, cone drive, weight about 24,000 lbs.

25" x 24' x 12' Centers, Blaisdell Lathe.

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10—2 x 24 J. & L. gr. and set overhead, sing. pulley drive, bar equipment.

3—2 x 26 P. & W., all feeds, oil pump, bar equipment, b.g., and friction head.

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15—No. 3 Smurr & Kamen 1¼", auto. chuck cap., oil pump, auto. feeds to turret, plain head.

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Complete list, No. 93, covering big stock, just off press. All machines for immediate delivery.

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Two Magazine Feed Automatic Screw Driving Machines

Manufacturer claims each machine capable of driving over 1000 screws per hour. Drives either Machine or Wood Screws.

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FIVE No. 76 National Acme Automatic Screw machines. Have been in use only six months (four spindle).

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Thomson Bevel Plate Shear.
42 Gould & Eberhardt, also 36" Heavy Drills.
80" Whiton Gear Cutter, also 18" B. & S.
18" x 10' Flather Quick Change Lathe, latest.
"LO-Swing" Fitchburg 3½" x 60" *New* (10) Lathes.
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Bolt Header Hex. and Sq. ⅝" capacity.
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Landis No. 22 Grinder, 12" x 36" capacity.
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30" Bridgeport Vertical Turret Boring Mill.
54" x 22' Triple Geared Lathe, Wood Light.
28" x 21' Pond Lathe, heavy pattern.
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Hydraulic Ship Keel Bender.
Hydraulic 6" x 6" Angle Iron Shear.
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G. L. Bennett Machinery Co., Inc.

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Jones & Lamson Turret Lathe 16" x 5'
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No. 56 Dbl. Housing Knuckle Joint Power Press
No. 3½ Greenerd Arbor Press
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Smith-Vaile Belt Driven 14 x 18, 400 cu. ft. 100 lb.
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Air Receivers 21" dia., 8' and 9' long, ½" Plate

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8 Drill Presses with Back Gears

1—American Heavy—
23½" Table, 2" Drill
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1 Springfield, Lathe Complete

36" Swing, 13½ ft. bed. Face plate jaws, center rest, compound slide rest, tail stock, and 5 step cone pulley, back gears.

Above offered subject to prior sale.

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18" Prentice Geared Head Hollow Turret Lathe
No. 3 Foster Geared Head Screw Machine
22" Ohio B.G. Crank Shaper
No. 2 Becker Plain Milling Machine
No. 25 Becker Plain Milling Machine (3)
No. 1½ Valley City Universal Milling Machine
No. 4½ Garvin Plain Milling Machine (3)
No. 3 Garvin Plain Milling Machine
No. 7 Becker Lincoln Milling Machine (2)
No. 3 Garvin Single Profiler
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28" Hamilton Sliding Head Drill
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We also have a large stock of machines on hand for immediate delivery.
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36" "W. E. Gang" (plain)—cone driven. Tapping attachment.
Ready for Shipment.

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where we carry a complete stock of new and second-hand machinery and Production Tools.

We will value the opportunity to handle your inquiries.

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ONE 34"x16' Wheeler planer, with two heads, light pattern.

One 3½' semi-universal radial drill.

Four 14" Pratt & Whitney, plain turrets, with double friction back gear and air chucks.

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48" Radial Drill

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ONE No. 25 24" Foote-Burt upright drill in first class operating condition.

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10′ Niles, two swivel heads, 80″ table, cone driven.

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40″ x 16′ Wm. Gleason, C.R., D.B.G., not screw cutting.

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2″ x 24″ Jones & Lamson, cone type.

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No. 2-A Newark, single pulley drive, 24″ x 8″ capacity.

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No. 0 Detrick & Harvey, floor type, 3½″ bar, universal table.

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30″ x 30″ x 10′ Putnam, one head, fine condition.

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24″ x 72″ Bement Massive Traversing Single Head, rebuilt, fine condition.

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12″ Sellers, motor driven, variable speed motor, 220 volts, D.C.

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5″ Hulbert-Rogers, accelerated feed, motor drive, as good as new.

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3—50″ Triple Geared Lathes.
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New Engine Lathes

20″ in 8′, 10′ and 12′ beds;
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For early delivery. Full information on application.

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ONE Engine Lathe, one 48″ Milling Machine and one Hydraulic Wheel Press; all in good condition. For full description and price write

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36″x36″x20′ Gray Planer, 2 heads.

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FOLLOWING NEW TOOLS:

No. 1 Cleveland Horizontal Boring and Drilling Machine, 2½″ bar.

200 Ton Watson-Stellman Hydraulic Bending Machine.

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Bought New in 1915-1916

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Swing 26½ in., Beds from 10½ to 14½ ft.

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Swing 16⅛ in., bed 6 ft.

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Delivery Now

16″ x 6′ Marvel Head Lodge & Shipley Engine Lathe.

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Two Brown & Sharpe No. 3 26″ Automatic Gear Cutters.

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24″ Cincinnati High Speed Shaft Driven Upright Drill with Gear Box and Tapping Attachment.

Universal Swivel Table for radial drill.

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Dry Grinder for two 12″ wheels.

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One Triplex single acting vertical Dean Pump, 4½″ bore x 4″ stroke.

36″ x 36″ x 24′ L. W. Pond Planer. Two heads on cross rail.

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MASTER ENGINE LATHE

Brand new, never used; 12 in. x 4 ft. 8½ in. bed, 30 in. center, complete with compound rest, countershaft, etc.

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10—18″ x 8′ "W. F. Davis"—3 step cone—double back geared—quick change feed—usual attachments.

Also a large assortment of other lathes from 13″ to 24″ swing.

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We Have Some Fine Shell Equipment—We Want More. Send Us Your Wants Also "For Sale" List

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Also a large stock of planers, lathes, column drills, pipe machines, presses, grinders, etc.

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2 Heads
Good Condition

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1—15 x 6 Sidney with taper
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Beaman & Smith special boring and facing. 4" bar, double drive, 26" swing, table 22"x28".

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American 3½' radial drill, speed box.
Bliss No. 5 Punch Presses, geared, new.
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New 59¼ S Toledo Press

Straight Side, 6 stroke, 600 tons pressure, 80,000 lbs., direct from manufacturers, ready to load. (Also others.)

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10 miles 75-lb. choice relayers.

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5000kva GE ATBIO-5000-720-13,200v 60cy 3ph with condenser complete.

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New 60cy 3ph, all sizes and voltages. Also DC.

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Lot like new 33' to 40'.

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1—5' Bement-Miles Universal, good as new.

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2 steam railroad 60' fine condition.

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Steel, good assortment, send requirements.

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Wood, with steel underframing, rebuilt like new.

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13' 6" Garrison Bending Brake or Press, Double geared, capacity ¼" plate full width. Ram pressure 250 tons. Catalog weight 118,000 lbs. Used very little; condition good as new. Located Pittsburgh District; available for immediate shipment.

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One 500-ton United Engineering & Foundry Co. Steam Hydraulic Forging Press, in good condition; Intensifier, Valves and Piping, all complete. Can be inspected in operation.

Union Tool Company

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Hydraulic Presses

250-ton three-cylinder Press, with Intensifier, 18" stroke.

85-ton Shear and Punch Press.

The above were furnished by R. D. Wood Company and never used.

Also a Hotching Press and 25-ton Riveter.

Can be seen at former plant of

American Engine & Electric Co.
BOUND BROOK, N. J.

For particulars address
HUGH C. PIERCE, Bound Brook, N. J.

HEAVY DUTY PRESSES

1—No. 202-C Toledo Plain Overhanging Double Crank Press; Bolster plate 30 x 42"; opening in bed 23 x 27"; width between uprights 36"; 2" stroke; weight of flywheel 650 lb.; total weight 5,700 lb.
PRICE $750.00

1—No. 204-A Special Toledo Geared Overhanging Double Crank Press; Bolster plate 31 x 40; opening in bed 13 x 32"; width between uprights 32"; 3" stroke; geared 6⅛ to 1; weight of balance wheel 850 lb.; total weight 13,300 lb.

Both of the above presses are without defect and in every way new for service.

CYLINDRICAL GRINDER

1—No. 2 Landis Universal Cylindrical Grinder; swings 16" dia., 32" long; complete with pump, countershaft, center rest, two back rests, wheel truing fixture and 6 dogs; weight 2,500 lb.; excellent condition.

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1—24 x 24" x 6' Smith-Silk Planer; single swivel head; weight 6700 lb.
1—17 x 17" x 4' Fitchburg Planer.

MILLING MACHINES

1—No. 0 Bickett Vertical Miller and Profiler
1—No. 1 United States Hand Miller.
1—Whitney Hand Miller.
1—No. 2-B Rockford Universal Miller.
1—No. 1½ Rockford Plain Miller.

DRILL PRESSES

1—32" Hamilton, B.G.P.F.
1—24" Hoefer, B.G.P.F., Sliding Head.
2—21" Hoefer, B.G.P.F.
2—20" Champion, B.G.P.F.
1—21" Hoefer, W. & L.
1—21" Champion, W. & L.
1—14" Canedy & Otto No. 27.
4—10" Barnes.

Seven hundred machines in stock.
We solicit opportunity to submit best offerings in the way of any equipment required.

WAYNE MACHINERY COMPANY,
Fort Wayne, Indiana

Gang Presses

6—American Can "Norton Pattern" Old Style Straight Sided Inclined Gang Presses, 1½" stroke, 28" between housings, 18" between slides, 24 x 18" opening in bed, 9" die space, 36 x 8" flywheel. Price each $300.00.

1—American Can "Norton Pattern" Improved Straight Sided Gang Press, on straight Legs, 2½" stroke, 28" between housings, 18" between slides, 24 x 18" opening in bed, 9" die space, 36 x 8" flywheel Price $300.00.

1—American Can "Norton Pattern" Improved Straight Sided Inclined Gang Press, 2½" stroke, 28" between housings, 18" between slides, 24 x 18" opening in bed, 9" die space, 36 x 8" flywheel. Price $300.00

Vonnegut Machinery Co.

Indianapolis, Indiana
Indiana's Largest Machinery Distributors

5—No. 2 Carbonizing Machines with electric control made by American Gas Furnace Co.
8—No. 4 Manville Headers.
19—No. 4 Manville Thread Rollers, largest diameter of screw ¼, length of thread 3⅜.
13—No. 3 Manville bolt trimmers, largest blank ⅜, longest 4½, shortest ¾.
10—E. G. 52 Ferracute Presses.

All above in first rate condition; prices on application.

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NEW BRUNSWICK N. J.

Machinery and Tools
OF
BIRMINGHAM BOILER WORKS

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1—**W. H. Wood, size No. 31 Hydraulic Riveter,** complete with accumulator, high pressure pump, overhead traveling crane, tank and hydraulic hoist, gap has 8 ft. 3 in. clearance.
Have numerous snaps, dies, and punches, as well as rivet heating furnace.
1—**Lennox Rotary Bevel Shear,** size 2, capacity ⅝" steel. Six extra cutting disks or shear blades.
1—**Set 10' 6" Power Bending Rolls** with reversing mechanism hand raising and lowering attachments, top roll 12" dia. Bottom rolls 8" dia.
1—**Chicago Pneumatic Air Motor Hoist,** 5 ton capacity, ⅝" cable.
1" **McGrath Air Flue Welder,** complete with 18x36 oil-burning Rockwell Furnace.
1—Flue cutter and cleaner, 120" long, belt drive.
3—Sturtevant 30" steel pressure blowers, $40 each.
2—Heavy cast iron round blacksmith forge bowls with connections, 48" dia., $35 each.
1—**American Radial Drill,** 42" arm, 36" swing, cone drive, with swinging and tilting table, with worm movement.
1—**No. 4 Long and Allstater Combination Punch and Shear,** 5" throat; no shear attachments, have punches and dies.
3—Anvils, 250 lb. each; 1 good shape, $25.00; 1 poor shape, $15.00.
300 ft. Track.
200 ft. 2 7/16" dia. line shaft with pulleys and hangers.
1—10 x 16 Nagle center crank, slide valve engine.
1—60" x 16' Horizontal boiler (return tubular).
1—10' x 10' x 6" deep, 3/16" plate tank (open top).
1—30" wide, 36" deep, 12' long tank (open top).
1—10 gallon air pressure fuel oil burner, or torch.
1—Air drill.
1—6" wrought iron vise.
1—Hand power hack saw.
1—Boiler testing pump.
1—Fairbanks 2000-lb. scale.
3—4000-lb. capacity Yale & Towne chain block, $75 each.
1—Hand shear.
1—**Set 4-ft. Bending Rolls,** rolls 5½" dia. (hand power).
1—**Set 7 ft. Bending Rolls,** rolls 6½" dia., either hand or belt drive.
1—**Set 36" Tinners Bending Rolls,** 2¾" dia.
1—**Jerecki Bolt Cutter,** capacity ⅝" to 1½" complete with dies for standard bolts and stay bolts.
1—Angle or rail bending and straightening machine, size 6", screw power.
1—Lot wood patterns for boiler castings.
1—Lot manila rope, steel, and wood blocks.
1—Lot of manhole castings.
10—Pneumatic air hammers and snaps.
1—Crane trolley.
1—Lot of hand tools.
2—Rivet forges.
1—Hand forge blower.
1—Wall crane, double channels, 12 ft. arm and attachments with trolley.
1—Small overhead crane, made of 8" double channels, 18' span, with trolley.
1—Small overhead crane made of single 12" I-beam, with trolley span 16 ft.
1—**10" Throat Horizontal Flange and Beam Punch,** capacity ¾".
1—**Allen 72" Portable Pneumatic Hammer, Boiler or Plate Riveter,** capacity 1" rivets.
1—**Allen Compression Lever Riveter,** 10" reach, 11" gap, capacity ⅞" rivets.
1—**Norwalk Straight Line High Pressure Air Compressor,** with primary and secondary air cylinders, making it two stage, 12" stroke, capacity about 250 feet free air per minute at 100-lb. pressure.
1—**Overhead 12-ton capacity hand-Power Traveling Crane,** 26' 8" span, constructed of 15" I-Beam, ⅜" web, 6½" flange.
1—**Overhead 10-Ton Capacity Hand Power, Traveling Crane, 26' 8" Span,** constructed of 15" I-Beam, ⅜" web, 6" flange.
1—Set of Flanging Clamps, 12' 8" clearance between housing screws, jaws 4⅝" thick.

All the above can be inspected by applying to John H. Moore, c/o Birmingham Boiler Works, 40th St. and 10th Ave., Birmingham, Alabama. Phone Main 1133, or care of Tutwiler Hotel, Birmingham, Alabama.

IMMEDIATE delivery, two No. 164 Toledo Toggle Presses, two No. 162 Toledo Toggle Presses, all double back geared. One No. 55 Toledo Straight Side Press, geared. Very little used.

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40-lb. Bradley hammer.
250-lb. steam hammer.
1¼" Acme stay bolt cutter.
No. 0 Niagara beader.
10-ft. squaring shear, No. 18 iron.
50" x 20' New Haven triple geared lathe.
10-ft. Chicago steel brake.
6" Forbes power pipe machine.
No. 10 Buffalo blower.
No. 13 Pratt & Whitney Lincoln miller.
No. 2 Long & Allstatter punch.
100-KW., three-phase, 60-cy., 220-volt generator, direct connected to Chuse engine.
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1—40-lb. Bradley Helve Hammer.
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Steam Hammer

"Erie" 2000 lb. Steam Drop Hammer for immediate delivery. This hammer bought new by us and used less than three months on light work.

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HAMMERS

Immediate Shipment.

1—2000 lb. Erie Steam Drop
1—1500 lb. Bliss Board Drop
1—1200 lb. P & W Board Drop
1—1000 lb. Billings Spencer Drop
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1—400 lb. W & W Yeakley Power
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CONSOLIDATED PRODUCTS COMPANY
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FOR sale by Taylor-Wharton Iron & Steel Company, in good condition, one 200 pound Bradley Cushion Steam Hammer, second hand, subject to inspection at High Bridge, N. J.

Full Forging Equipment

Composed of Slightly Used

Bliss Presses,
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Ajax Forging Machines,
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Various other machines.

Inquire:
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Forging Machines

Two 1½" Ajax Upsetting and Forging Machines.
One 2" Ajax Upsetting and Forging Machine.
One No. 1 Williams White Bulldozer.
One Williams White Eye Bender.
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Available for Immediate Delivery

One Pair Niles Bending Rolls No. 2, 8' x 10" dia., pyramid type, good as new.
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One Horizontal Punching and Bending Machine.
One Oster 6" Pipe Machine.
One Heavy Steel Body Armor Plate Punch.
One 6' Cornice Brake.
One 8 x 8 Air Compressor with Receiver and tools.
One American Tenoning Machine.
One American Mortising Machine.
One 36" Band Saw.
One Iron Saw Table.
One Little Giant No. 2 Keyseater.
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One Rockford Horizontal Boring, Drilling and Tapping Machine No. 2, practically new.
One Prentice Bros. 3½' Arm Plain Radial Drill.
One Cincinnati Bickford Speed Box type Radial Drill with 4' Arm.
One New Haven Engine Lathe 32" x 16'; excellent condition.

Factory & Mill Supply Co.
MACHINERY
187 Oliver Street BOSTON

Double End Punch and Shear

Punch 1" through 1", Shear ¾"x6", Depth of throat 11".
Over 160 sets of dies, angle cutter, etc.

R. A. PINNER
122 Water Street, NEW YORK, N. Y.

Immediate Delivery

Niles type double angle shear, on turn table arranged for motor drive, capacity 8" x 8" x 1" Angles.

The A. R. Williams Machinery Co., Ltd.,
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1—16 x 36 Allis girder frame.
1—20 x 42 Allis girder frame.
1—24 x 48 Lane & Bodley extra heavy duty.
1—24 x 48 Hamilton heavy duty.
1—24 x 48 Hamilton girder frame.
1—20 x 40 x 48 Murray heavy duty with rope drive wheel.

GENERATORS

1—150 H.P. 4 cylinder Bruce-MacBeth gas engine direct connected to 100 K.W. Crocker-Wheeler 125 volt D.C. generator.

WOODWORKING MACHINERY OF ALL KINDS; IRONWORKING MACHINERY OF ALL KINDS; SHAFTING; PULLEYS; HANGERS AND BELTING.

Cleveland Belting & Machinery Co
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75 Horse Power Horizontal Gas Engine and 65 Horse Power Gas Producing Machine, complete with pumps, pipes, blower, etc., all in first class condition for immediate delivery.

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Corliss Engine

10" x 30" Whitehill—Tangye Bed—Wrights patent Ball Governor with automatic stop—Split Flywheel 8' x 13" x 4" rim, together with Berryman 150 H.P. feed water heater and purifier. Also DYNAMO 35 K.W.—Thomson Houston Elec. Co. Bi-polar, 110 volts, 130 rev.

CLEVELAND & WHITEHILL CO.,
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STATIONARY ENGINE

One 350 H.P. Green Slide Valve Engine equally as good as new, size 22" x 48", wheels 16' x 32".

HOISTING ENGINES

1—Lidgerwood 14 x 18 D.C., three tandem drum, suitable for cableway.
1—Shannon 7¼ x 10, D. C., D.D., with boiler.
1—Mundy 6¼ x 10, D.C., D.D., skeleton.
2—Mundy 6¼ x 10, D.C., D.D., with boilers.
1—National 5½ x 10, D.C., D.D., with boiler.

BOILERS

3—American-built Scotch Type Marine Boilers, 12' 6" dia. x 20' long, double end, three corrugated furnaces each end, 160 lbs. steam.
1—350 hp. horizontal return Tubular boiler, 125 lbs. steam.

STEEL BUILDING

100 ft. x 70 ft., practically new, 6 bays, 16' 8", 39' in clear.

ANCHORS

10—New Mushroom Anchors, 5000 lbs. each.

PIPE

6000 ft. strictly first-class 6" Wrought Steel Pipe, equally as good as new.
700 ft. strictly first class 20" dia. Steel. Riveted Flange Pipe, lengths 20' each.
400 ft. 24" dia., 30' lengths, equally as good as new.

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1—65 ton Bucyrus, 2½ yd. dipper, standard gauge.
1—No. 1 Thew Traction Steam Shovel, ⅞ yd. dipper.

CENTRIFUGAL PUMPS

1—Morris No. 12, 14" suction, 12" discharge, direct connected to horizontal engine, 18 x 10, 4500 gallons capacity per minute.
1—Belt driven, 8" suction, 6" discharge, 1000 gallons capacity, 125 ft. head.

CAR TRUCKS

34—Standard Gauge Car Trucks, 4 wheel. Wheels 24" diameter, in first-class second-hand condition.

RAILS

600 tons strictly first-class, 30 lb. Relaying Rails, with 4 hole angle bars.
We have a large tonnage of all weight Rail from 20 to 100 lb. Relayers; pass any inspection.
1—Logging Engine, size 7 x 10, double cylinder, double drum, with boiler.
1—36" gauge, 28 ton Climax Locomotive, North Carolina delivery.

HENRY A. HITNER'S SONS CO.
Station K Philadelphia, Pa.

GAS ENGINES

We have a 10 H.P. Gas Engine for sale.

Huntley Manufacturing Co.
Silver Creek, N. Y.

ONE 60 H. P. Tandem, 2 cylinder, 4 cycle, Throttling Governor Control Elyria Gas Engine. Pulley 36 x 12. 210 R.P.M.

HUNTER SAW & MACHINE CO.,
Pittsburgh, Pa.

Engines and Hoists

Seven—14x18 Erie Engines, complete with 60" flywheel, 6" base, 180 r.p.m., complete with governor, cylinder oilers, sight feed oil cups, drip valves, exhaust pipes, and gate valves.

Connected to

Seven—Twin Drum Hoists —30" in diameter, 17¼" face, slow speed, 3 15/16" bore, hubs oil grooved, geared to 65" cast iron gears, with 4" face. Complete with oilers, run on a plain shaft 3 15/16" diameter, 7' long. Drums not scored.

STERLING IRON & STEEL CO.

10th & Hamilton Sts.
Philadelphia, Pa.

Power Plant Equipment

25 x 24 Robb Corliss R.H. Engine 150 R.P.M., direct connected to 375 KW., 3 Phase, 600 Volt Generator.

A. R. Williams Mchy. Co., Ltd.
St. John, N. B., Canada

We offer the following Machinery in part or as a whole, subject to prior sale, and your acceptance in Bridgeport: 1—125 horse power, 3 cylinder type, vertical, direct connected, Wood pattern Diesel Engine, 225 R.P.M., 12″x18″ cylinder, manufactured by the American Diesel Company, complete, with 10,000 gallon wooden tank, piping and steel fuel tank, together with all other accessories and appurtenances. 1—Belt Driven Ingersoll-Sargent Air Compressor, complete, with electrical equipment for fitting up switchboard, ammeters, voltmeters, rheostat, circuit breakers, switches, transformers, etc. 1—100 K.W. Fort Wayne Generator, direct connected to oil engine. 1—Belted 8 K.W. Fort Wayne D.C. Generator, used as exciter. 6—Air Bottles, with 3 1000-lb. pressure gauges, piping, etc.

If interested forward inquiries to

Mr. W. V. HIPSLEY
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CORLISS ENGINES
30x48 Whitehill HEAVY DUTY.
28x48 Hamilton HEAVY DUTY.
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CORLISS ENGINE D.C. TO GENERATOR
1—16x36 DOUBLE ECCENTRIC, Rolling Mill Type D.C. to 150 KW., 125 volt Generator.

HEATING BOILERS
1—72″x16′ Kewanee Fire Box.
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BRASS TUBE CLOSED TYPE HEATERS
1—48″x16′ Berryman.
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1733 First National Bank Building, Chicago

ONE Harris Tandem, compound, Corliss Engine, 10″ x 20″ x 24″ with 24′ x 12″ flywheel left-hand side.

THE JOHN BAIZLEY IRON WORKS.
514 South Delaware Ave.,
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ENGINES

Corliss Engine, in good condition, located at Middletown, N. Y. Also 30 H.P. two-cylinder vertical Nash gasoline or gas engine, located at Walden.

SCHRADE CUTLERY CO.
Walden, N. Y.

1—Lidgerwood Mfg. Co. Quarry Hoist with 65 foot boom, 30 H.P. 3 Drum standem engine with extra shaft and pinion and 8 H.P. double winch engine with reversible link.

1—American Ball Engine, 17″x14″.

1—American Ball Engine, 11″x10″.

1—Fairbanks Bull Dog Gas Engine, 12 H.P.

ARMOUR GRAIN CO.,
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ONE 18 x 28″ Watertown Automatic Cut Off Box Bedplate Engine in good condition.

Two No. 6 Wilbraham Baker Positive Pressure Blowers, 1 right hand and 1 left hand, both direct connected to a 14 x 18 Horizontal Box Bedplate Engine, all in good condition. Will sell as an entire plant or will sell Blowers separately.

Two 100-ton Callian Cupolas with stacks, Cupolas 48″ inside diameter of lining, in fair condition.

One 1000 HP. Vertical Berryman Exhaust Heater, 10″ inlet, 10″ Exhaust Outlet, first-class condition.

One 80 ft. wrought stack 36″ diameter, suitable for two 100 HP. Boiler.

PENN RAG AND METAL CO., INC.
Reading, Pa.

CORLISS
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ENGINES

50 to **2000** HORSEPOWER
EVERY ENGINE PERFECT
INSPECTIONS EASILY ARRANGED

My Service Reaches from Coast to Coast

H. M. BRUCH, Engine Specialist
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CORLISS ENGINE

One used 16 x 36 heavy duty left hand Corliss Engine, 150 H.P., at 125 pounds steam, 80 revolutions. Flywheel pulley 14 ft. x 24 inch face and belt pulley 11 ft. x 20 inch face on engine shaft. Immediate delivery.

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Wellman-Seaver-Morgan Co.
CLEVELAND, OHIO

ONE 170 H. P. De La Vergne Oil Engine. Excellent condition.

RICHMOND FORGINGS CORP.
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ENGINES

10x30 Corliss	18x36 Allis	24x24 Erie Ball
12x30 Murray	18x42 Nordberg	24x48 Ham.
12x36 Allis	19x20 Skinner	26x48 Allis
14x36 Ham.	20x42 Monarch	28x48 Brown
16x36 St. Louis	20x48 Wetherill	30x60 Allis
16x42 Allis	22x42 Vilter	30x60 L. & B.
16&34x42 Tand. Minneapolis	14&26x36 Cooper Tand.	
	18&32x48 H & B Tand.	
16&30x42 Bates Tand.	26&42x48 Cooper C. Comp.	
20&32x42 Allis C. Comp.		

HAROLD R. WILSON MACHINERY CO.
415 Pine St. Other Sizes. St. Louis, Mo.

Immediate Delivery

1—200 H.P. Knowlson & Kelley, Corliss Engine, 12′ flywheel. (In use only a few weeks.)
1—DeVries Feedwater Heater.
1—Leather Belt, 75′ long, 30″ wide, 2 ply. (In use only a few weeks.)
2—8′ wood pulleys, 30″ face.
About 100′ of 4″ shafting with hangers and miscellaneous wood pulleys.

Early Future Delivery

2—125 H.P. Tubular Boilers (Franklin Boiler Works, Troy, N. Y., makers).

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DOUBLE Reversing Geared Blooming Mill Engine, 28 inch pinions and housings, Engine entirely rebuilt, Pinion new.

Immediate Delivery.

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Power Plant Equipment

10″ x 30″ Corliss engine.
12″ x 30″ Corliss engine.
12″ x 36″ Corliss engine.
14″ x 21″ Corliss engine.

WASHINGTON CO.
39 Cortlandt Street New York City

Air Compressors
Good Condition

1. INGERSOLL SARGEANT duplex steam air, 1540 cu. ft., air press. 30-50 lbs., H.P. 159-201.
1. Rand duplex steam air, 1600 cu. ft., air press. 50-75 lbs., H.P. 323-400.
1. Ingersoll-Rand straight line, 973 cu. ft., air press. 25-100 lbs.
1. Rand comp. steam, duplex air, 2693 cu. ft., air press. 50 lbs., 340 H.P.
1. Ingersoll-Sargeant steam-air, 1000 cu. ft., H.P. 195.

WELBORNE & CO.
Machine and Small Tools
45 Beaver St., N. Y.

AIR COMPRESSOR
NEW

Made by the Chicago Pneumatic Tool Co.
8″ x 8′ N-5B.
Belt Driven.

Complete with differential unloader and all fittings.

150 lbs. pressure.
250 lbs. R.P.M.

FAIRBANKS, MORSE & CO.
MACHINE TOOL DEPT.
30 CHURCH ST., NEW YORK CITY

COMPRESSORS

1—Ingersoll AA2, 2 Stage, 1120 cu. ft. Steam
1—Ingersoll Duplex, 2 Stage, 450 cu. ft. Steam
1—Ingersoll Duplex, 2 Stage, 340 cu. ft. Steam
1—Smith-Vaile Duplex, 2 Stage, 750 ft. Steam
1—Ingersoll Compound Steam & Air, 1950 cu. ft.
1—Ingersoll 10-30 lb. Belt Driven, 500 cu. ft.
1—Ingersoll 25-50 lb. Belt Driven, 1600 cu. ft.
Other sizes belt and steam

F. L. Howland, 90 West St., New York

Air Compressors

2—28″ x 30″ and 19″ x 30″ Norwalk, 2200 cu. ft. capacity
1—22″ x 22¼″ x 24″ Ingersoll A1, 973 cu. ft. capacity
1—16″ x 26″ and 16″ x 42″ Ingersoll-Cooper Corliss steam end, two stage air, 2100 cu. ft. capacity.
1—10″ x 12″ and 8″ x 12″ Laidlaw Dunn duplex two stage, 186 cu. ft. capacity

THOS. P. CONARD
No. 2 South 15th St., Philadelphia

One straight line, compound air, steam driven Norwalk Air Compressor, slide valve, in the very best of condition, delivers 1160′ free air per minute at 110 revolutions, 100 lbs. air pressure with from 90 to 100 lbs. steam pressure, used about 8 months.

Two Ingersoll Sergeant steam driven, straight line, compound Air Compressors, 866′ capacity at 110 revolutions per minute. Low pressure cylinder 20¼″, high pressure 13¼″, steam cylinder 18″ diameter, common stroke 18″. Both in excellent condition.

One Ingersoll Rand Class OC-3, full steam, compound and duplex Air Compressor, 3336′ capacity at 120 R.P.M. Right hand steam cylinder 20x30, air 20¼x30, left hand steam cylinder 38x30, air 33¼x30, length over all 33′ 3″, width 14′ 8″, height 11′, diameter of flywheel 135″, weight of flywheel 13,500 lbs. Shipping weight of the entire outfit 19,500 lbs. Very best of condition, fully guaranteed.

One Ingersoll Sergeant steam driven Air Compressor, compound and duplex. High pressure steam cylinder 18½″, air pressure, 24″. High pressure air cylinder 18½″, low pressure 22½″. Common stroke 16″, capacity 925 cu. ft., 135 R.P.M., excellent condition.

One Ingersoll Sergeant Air Compressor, steam driven, compound, capacity 348′ per minute, 100 lbs. pressure. Size of stroke 10x9¼x16¼.

Two Ingersoll Sergeant belt driven Compressors, capacity 365′ per minute. Right hand cylinder 10¼″x10″, left hand 16¼″x10″, complete with unloading devices, in good condition.

One Ingersoll Rand Air Compressor, compound air, duplex steam, 524′ capacity, right hand steam cylinder 12x12, air 12x12. Left hand steam cylinder 12x12, air 18¼x12.

Several other Air Compressors.

One Cable Engine, manufactured by John A. Roebling Sons Co., with two drums. Large drum grooved to suit 1″ wire cable and will accommodate about 2 miles of fall. Double cylinder 12x15, has one extra drum set in front as an auxiliary. Width of large drum 4′9″, diameter 6′5″, flange 14″ deep. Width of auxiliary drum 2′6″, diameter 2′6″, flange 7″ deep.

One American Hoist with boiler, double drum, double cylinder, 8¼x10, quadrant operated. Boiler 42x84. In good condition.

One Rawson & Morrison Skeleton Hoisting Engine, 6 drums set tandem, three on a side. Cylinders, 8¼x10, quadrant operated, will accommodate either two or three derricks.

Three 100 horse power Boilers, built by Ames Iron Works, 18′ long, 6′ diameter. 82—2¾″ tubes, complete with steam gauge, fronts, fittings, etc.

Several horizontal Steam Engines, various sizes from 10 to 150 horsepower.

Several narrow gauge Flat Cars, used for hauling loads of 50 tons capacity. Bodies about 16′ long, 6′4″ to 7′ 9″ wide. Both with and without springs, draw bars and brakes.

Lot of 35 lb. Rail.

Over 150 tons of black and galvanized Iron Pipe.

QUINCY SALES CO., Inc., 294 Washington Street, Boston, Mass.

Air Compressors

1—Ingersoll - Rand Imperial Type 10, capacity 1190 ft. free air per minute, at 110 lb. pressure. Two stage air, duplex steam.

1—Rand belted, size 12″x18″, capacity 300 ft. per minute at 100 lb. pressure, complete with 36″x96″ air receiver.

F. Mayer
1601 Monadnock Bldg.
Chicago, Ill.

AIR COMPRESSOR 100 LB.

310 cu. ft. Ingersoll-Rand, 12¼ x 12 class NE-1, belt driven.

Immediate delivery, in excellent condition.

A. G. SCHOONMAKER & SONS, Inc.
(Owners)
25 Church Street New York City

AIR COMPRESSORS
STEAM DRIVEN

1—Sullivan-Corliss Cross Compound, 2577-ft. capacity, 110 pound air.
1—Sullivan-Corliss Tandem Compound, Class WC, 2400-ft. capacity.
3—Sullivan Straight Line, Class WB-2 909 and 1160-ft. capacity.
1—Ingersoll-Rand Imperial, Type 10, Compound Steam & air, 1050-ft. capacity.
1—Rand Imperial, Type 10, 599-ft. capacity.

BELT DRIVEN

2—Ingersoll-Rand Imperial Type 11, 704 and 888-ft. capacity.
1—20x12½x16 Sullivan WJ, 873-ft.
1—18x11x14 Sullivan Angle Compound 886-ft.
2—Ingersoll-Sergeant, Type JC, 25½x-16½x16.

Above Compressors are in first class condition. Prices right. Specifications on request.

LANDRETH MACHINERY CO.
JOPLIN, MO.

Battery of 2 Horizontal Return Tubular

BOILERS

80 H.P., 66″ Diameter, 15 Ft. Long, Full Flush Front—90 Tubes.

FRED W. ROWE CO., INC.
728 Eastern Parkway, Brooklyn, N. Y.

Boilers and Engines

4—72 x 18 H.R.T. Boilers.
8—520 H.P. B & W Boilers, 160 lb. pressure.
1—150 H.P. B & W Boiler, 150 lb. pressure
3—Frick Corliss Engines 18 x 36, right and left hand.

JOHN M. GREENE
261 Drexel Bldg. Phila., Pa.

Our recent sales have been of BOILERS, CRANES, DERRICKS, etc. Why not write us?

The Curtiss-Willis Co.
INCORPORATED
30 CHURCH ST. NEW YORK

Mechanical Equipment
Wire Rope
"We Find Things"

New Boilers

Immediate Shipment

2—72″ x 18′ H. R. T., 125 lbs.
3—72″ x 18′ H. R. T., 143 lbs.

A. S. M. E. Code, all Standard Equipment and Stacks

Boilers, Engines, Generators, Etc.

BUNTON & BOCKIUS
945 Oliver Bldg., Pittsburgh, Pa.

HEINE BOILERS

1—250 H.P. each, butt-strapped "Heine" water tube boilers, complete with Wetzel mechanical stokers. These boilers have been in use about 5 years and never carried over 100 lb. pressure, but are suitable for 180 lb., ready for prompt delivery.

H. P. BREARLEY
90 West Street New York City

BOILERS

For Quick Shipment

1—185 H.P. Erie City Horizontal Water Tube Boiler, 150 lb. Pressure
10—250 H.P. Wicks Vertical Water Tube Boilers, 150 lb. Pressure
1—300 H.P. Wicks " 160 lb. "
1—500 H.P. B. & W. " 150 lb. "
2—400 H.P. B. & W. " 150 lb. "
1—250 H.P. B. & W. " 150 lb. "
1—275 H.P. B. & W. " 150 lb. "
2—200 H.P. Heine " 150 lb. "
1—425 H.P. Heine " 159 lb. "
1—400 H.P. Stirling " 150 lb. "
1—260 H.P. Stirling " 150 lb. "
1—200 H.P. Scotch marine type Boiler, 125 lb. Pressure

Steel Smoke Stacks

6—66" x 16' horizontal return Tubular Boilers, 125 lb. Pressure
4—72" x 18' Tubular Boilers, 125 lb. Pressure
And other makes and sizes.

J. F. DAVIS
1408 Harris Trust Bldg., Chicago, Ill.

---

(2) 250 H.P. Geary W.T. Boilers
With RONEY STOKERS and Stack, insured 150 lbs.

30 K.W. 125 V. West Generator
CONNECTED TO 8 x 10 CHANDLER & TAYLOR ENGINE.

(2) 13 In. Reed Screw Cutting Lathes
Beds 42 inches long. We use them for turning pistons. They have hollow spindles, rise and fall rests, clutch countershafts. Price $125.00 each.

28" x 10' Planer Made by Lowell Machine Works
Screw driven table, with countershaft, $200.

The Herfurth Engine Co., Inc., Alexandria, Va.

Boilers

	H.P.	Make	Pressure	Each
One	400	Heine	160	$6000
One	306	Heine	175	6000
One	225	Heine	175	4000
Three	203	Heine	160	2400

Power Machinery Exchange, Inc.
1 Montgomery St. Jersey City, N. J

BOILERS

H.P.	lb.	H.P.	lb.
518 Sterling	160	2-125 B. & W.	160
2-483 Heine	175	60x16	125
2-350 Stirling	150	2-66x16	125
250 Heine	150	72x16	125
150 Heine	150	2-72x18	125
3-250 Vogt	160	4-72x22	150

ENGINES—GENERATORS—MOTORS, ETC.
Write us for any second-hand machinery
HAROLD R. WILSON MACHINERY CO.
415 Pine St. Other Sizes. St. Louis, Mo.

PROMPT SHIPMENT
UNIFLOW BOILERS
134, 155, 216, 260, 313 H.P.
Noted for high efficiency, great overload capacity, compactness and smokeless combustion. Wire or Write

UNIFLOW BOILER CO., Inc.
2 South 15th St., Philadelphia, Pa.

HIGH PRESSURE BOILERS

2—250 H.P. each, Heine water tube boilers with Wetzel mechanical stokers, 180 lb. insurance.
2—275 H.P. each, Heine water tube boilers, with Wetzel mechanical stokers.
1—264 H.P. Babcock & Wilcox water tube boiler.
2—Wet back, Marine type, 10' x 10' boilers.
1—328 H.P. Horizontal tubular, suspended type boiler.

H. P. BREARLEY
90 West Street New York City

Two each 525 and 325 H.P. B & W Boilers, with steel headers, 150 and 160 lbs. steam, complete; two 42 stacks, heavy metal, 100 ft. each; two 100 H.P. Horizontal Return Tubular Boilers, 125 lbs. steam; one upright and horizontal engine, automatic, self-contained; 20 tons 6" cast iron B & S pipe; 15,000 ft. 4" wrt. pipe, with new nipples and threads; 40 all steel flat cars, for brick work, etc., like new; 36" gauge; 50 H.P. Locomotive Type Boiler; 25 tons, 20 and 25 relaying rails; four round closed tanks, 60" x 20 ft. long; one 325 H.P. butt strapped drum B & W Boiler, used three years. Three 72 x 20 ft. horizontal Return Tubular Boilers, 125 lbs. steam; two reels ⅜ Plow Steel, one reel each 1¼ and 1½ Plow steel, all 6/19, 8000 ft. each reel; will cut to suit; 100 reels ½ to 2¼" wire rope on reels, for hoisting, skidding, guys and cables; 20,000 ft. ⅝ NEW Galvanized Wire Rope, long and short lengths. One 10 x 10 Steam Driven Ingersoll-Rand Air Compressor, with receiver, fine condition; one 10 x 10 Belted Ingersoll-Rand Air Compressor.

EASTON MACHINERY CO.
Drake Bldg. Easton, Penna.

Boiler

125 H.P. Triple Butt Strapped Boiler, 66" in diameter, containing 54 four inch tubes. Allowed 125 pounds steam pressure. Perfect condition, complete with all the usual fittings.

STERLING IRON & STEEL CO.,
10th & Hamilton Sts., Phila., Pa.

Boilers

Immediate Delivery

3—300 lb. Holyoke Manning boilers, now located in Massachusetts. Good for 150 lbs. 11 yrs. old. In splendid condition.

5—150 lb. Manning boilers, now located in New Hampshire. Good for 135-140 lbs.

6—90" x 18' 6" Horizontal Return Tubular Dillon boilers, now located in Rhode Island. Installed in 1905.

JOSEPH MYERSON
274-278 Commercial St., Boston, Mass.

BOILERS

1—48 x 18 H.R.T.—125 lb.
1—54 x 12 H.R.T.—100 lb.
1—54 x 16 H.R.T.—125 lb.
3—72 x 16 H.R.T.—115 lb.
2—New 72 x 18 H.R.T.—150 lb.
1—50 H.P. Nagle—140 lb.
1—60 H.P. Fire Box—100 lb.
3—150 H.P. Heine—150 lb.
5—229 H.P. B & W—160 lb.
7—268 H.P. B & W—160 lb.
4—250 H.P. Sterling—150 lb.
3—300 H.P. Heine—150 lb.
2—305 H.P. B & W—160 lb.
1—305 H.P. B & W—200 lb.
5—300 H.P. Campbell & Zell—B & W type—160 lb.
2—350 H.P. Campbell & Zell—B & W type—160 lb.
1—400 H.P. Erie City—175 lb.
2—458 H.P. B & W—160 lb.
2—500 H.P. B & W—160 lb.
1—517 H.P. Sterling—150 lb.

Crockwell Mine & Mill Supply Co.
706 Federal Reserve Bank Bldg., St. Louis, Mo.

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2 Stirling Boilers

Each 218 H.P. with Murphy Stokers. 1 Cochran Heater, 3 Worthington Pumps, 1 Allis Heavy Duty Corliss Engine 16 x 36, 1 Ide Engine 11 x 18 x 14, direct connected to Crocker-Wheeler 85 K.W. Generator.

Available July 1st; all good as new; can be seen in operation.

VAUGHAN & BUSHNELL MFG. CO.
2114 Carroll Ave., Chicago

Heine Boilers

8—300 H.P. HEINE WATER TUBE BOILERS, 160 lbs. pressure. Hartford Inspection, fully equipped, including Boyer soot blowers, hand fired.

Immediate Delivery Attractive

A. G. SCHOONMAKER & SONS
25 Church Street New York

Centrifugal Pumps

2—De Laval, single stage centrifugal pumps, one an a half million gallons, capacity 60 pounds pressure, 147 ft. head, direct connected to Westinghouse 50 H.P. electric motors. Can sell separately.

NATHAN KLEIN & CO.
206-208 Centre St., N. Y.

ONE 12 x 24 Rotrex Vacuum Pump and one condensate left pump, both driven and direct connected to one 6 x 5 enclosed, self-oiling engine. One 8" Class "C" Brass Fitted Circulating Pump, mounted on same base and driven by a 40 H.P., G.E. motor, squirrel cage type. Delivery within two weeks.

General Equipment Co.
30 Church Street New York

EQUIPMENT. Centrifugal PUMP and MOTOR, American 1½" outlet, 2" inlet on iron base, direct connected to 10 H.P., 220 V., 1750 RPM. Robbins & Myers D.C. motor, with C. H. Self Starter and Float Switch. Price...$250.00

1—8 x 4 x 8 Marsh, 2 stage belted COMPRESSOR with tank.....$300.00
Immediate shipment. Subject to prior sale.

ARTHUR JONES ELECTRIC CO.
2843 South State Street Chicago

Triplex Pumps

Deane 2—5½ x 8. 1—5 x 8. 2—5 x 6.
Rumsey 1—8¼ x 10.
Platt Iron Works 1—3½ x 4.

Cameron Pumps
1—No. 9—5" suction, 4" discharge.
1—No. 2—2½" suction, 2" discharge.

A. G. SCHOONMAKER & SONS, INC.
25 Church St., New York

1—Dings Magnetic Separator No. 3M, complete with 230 volt D.C. motor, wiring, pulleys, belts and guards, read to run. Machine has never been used.

ADDRESS BOX F-556
care *The Iron Age*, New York

—10 H.P. type CE 220 V, 700 R.P.M. Direct Current.
1—15 H.P. Type CE 220 V. 690 R.P.M. Direct Current.
Motor complete with Slide Rails and Starting Rheostats. Practically as good as new. Available in thirty days. No dealers.
THE CUMMINGS MACHINE CO., M'nster, Ohio

For Immediate Delivery

200 H.P., 220 v. D.C. compound wound, 475 RPM., G. E., Ft. Wayne, motor complete.
50 K.V.A., Westg., 220 v., 60 cyc., 2 ph., complete; 40 H.P., G. E. 440 v., 2 ph., 60 cycle, form L (comparable to slip ring).

ELECTRIC MOTOR & REPAIR COMPANY
264 Halsey Street Newark, N. J.

D.C. UNITS, 125/250 VOLTS

K.W.	Make	Volt	Engines
400	G. E.	250	18x36x42 Atlas Cor. Tand.
300	G. E.	250	Ball & Wood C.C. Cor.
275	G. E.	250	25x26 Harrisburg (New)
200	Allis	250	14&22x30 Allis Cor.
200	Sprague	250	26x36 Corliss, 100 Rev.
4-150	G. E.	250	Ball & Wood Tand.
150	Goodman	250	18x19 Ridgway
100	C.-W.	250	10x16x14 Erie Ball

HAROLD R. WILSON MACHINERY CO.
415 Pine St. Other Sizes. St. Louis, Mo.

IMMEDIATE DELIVERY

Two 150 KW. Sprague Generators
One 100 KW. Sprague Generator
D.C. 250 volts, direct connected to American Ball Duplex Compound Engines. Also 25 to 150 KW. direct connected 125 V. Sets.

HIRAM E. ACKERLY
70 Fulton Street, N. Y.

QUALITY and SERVICE has been our chief argument for years. ***Quick Delivery,*** however, now counts for more than anything else. If you can get ***quick delivery now*** and be assured that the machine is O.K., ***tested,*** and ***as represented,*** that's the place to buy and that is exactly what you get from us if you send us your orders. Our stock of large motors changes from day to day. Write us your wants, we may have it even if not listed here.

Write today for our Monthly Bargain Sheet showing present stock with net prices.
We are America's headquarters for second-hand Electrical Machinery.

125 V. D.C. Generators

KW.		Speed
1	2½ Jenney	1250
1	4½ Roth	2150
1	4½ Sprague-Lundell	900
1	4½ C. & C.	875
2	4½ Lee & Hoff	775
2	5½ Jenney	1500
1	6 Wagner	700
1	6½ Roth	1350
1	6½ Milwaukee	950
1	6½ C. & C.	850
1	7 Westinghouse	1200
1	7½ Fairbanks-Morse, interpole	1700
1	7½ Watson	1600
2	7½ Westinghouse	1350
1	7½ Western Elec.	700
2	9 Jantz & Leist	1000
1	10 Western Elec.	1350
1	11 Northern	1250
1	12 Gen. Elec., interpole, type CVC	1800
1	12½ Browning	1400
1	12½ Westinghouse, type S	1100
1	17 Thresher	800
1	17½ Westinghouse, 700 light, direct-connected to 9x10 in. Erie City engine	375
1	20 Northern	1350
1	20 Sprague-Lundell	1000
1	20 Northern	1000
1	25 Northern	1050
1	25 Westinghouse	975
1	30 Crocker-Wheeler	800
1	37½ Westinghouse	900
1	65 Keystone	900
1	65 C. & C.	650
1	65 Crocker-Wheeler	625
1	100 Allis-Chalmers, 6-pole,	650
1	100 Westinghouse, MP, 400 light, direct-connected to 11x18x13 in. Harrisburg tandem-compound engine	275

250 V. D.C. Generators

KW.		Speed
1	12½ Sprague, 125-250 V., 3-wire	870
1	17½ Diehl	1000
1	20 Northern	675
2	22½ Sprague, 125-250 V. 3-wire	1050
1	40 Sprague, 125-250 V. 3-wire	1050
1	50 Ft. Wayne, to Habercorn engine	275
1	55 Ft. Wayne 125-250 V., 3-wire	950
1	100 Gen. Elec. to Buffalo Forge engine	260

550 V. D.C. Generators

KW.		Speed
1	90 Ft. Wayne, 6-pole, type LB	750
1	150 Gen. Elec., 6-pole, form H	400

60 Cycle A.C. Generators

KVA.		Speed
1	12 Aaron, single-phase, 220 v.	1800
1	50 Westinghouse, 2-phase, rev. field, 2300 v.	1200
1	50 Westinghouse, rev. field, 2300 v.	1200
1	50 Westinghouse, rev. field, 240 or 480 v.	1200

60 Cycle A.C. Generators

KVA.		Speed
1	150 Westinghouse, 3-phase, 2300 v., rev. field	900
1	150 Westinghouse, 3-phase, 220 or 440 revolving field	900
1	150 Westinghouse 2 or 3 phase, 2300 volts, revolving field, to Fleming Harrisburg engine,	257
1	200 Westinghouse rev. field 240 or 480 volts, 3 phase	720

110 Volt D.C. Motors

H.P.		Speed
1	3¾ Ft. Wayne	800
1	3¾ Diehl, double shaft-extension	475
1	4 Excelsior	800
1	5 Connecticut	1700
1	5 Northern	1650
1	5 Fairbanks-Morse	1150
1	5 Holtzer-Cabot	950
1	5 Jenney, MP., vertical shaft, comp., on tripod	925
4	5 Western Elec., comp., totally encl. hoist-motors	900
1	5 Sprague-Lundell, comp.	700
2	5 C. & C., Multipolar, type S, comp.	680
1	5 Sprague-Lundell	500
1	5½ Diehl, double shaft-extension	460
1	6 Gen. Elec., variable speed	460-2600

110 Volt D.C. Motors

H.P.		Speed
1	7 Roth	900
1	7 Sprague	235
1	7½ Roth, vertical shaft	1550
1	7½ Sprague, interpole	1200
1	7½ Milwaukee	825
1	7½ C. & C. comp.	620
1	7½ Wagner, comp.	520
1	25 Western Elec.	600
2	7½ Triumph	260
1	10 Robbins & Myers	1000
1	10 Holtzer-Cabot	950
2	10 Ideal, MP., comp., elevator motors with Schureman controlers	950
3	10 Browning	900
3	10 Jantz & Leist	800
1	10 Gen. Elec	650
1	10 Western Elec.	575
1	12 Western Elec.	950
1	12½ Western Elec.	1240
1	13 Jenney	1050
1	20 Westinghouse, type S, vertical shaft	1700
2	20 Browning	960
1	20 Northern, comp.	800
1	20 National	700
1	25 Northern, comp.	900
1	25 Western Elec., enclosed	650
1	25 Western Elec.	600
1	27 Sprague	590
1	30 Northern, interpole	550
1	37½ Reliance, interpole, type FT	475
1	50 Commercial	600
1	75 Crocker-Wheeler, comp.	550

220 to 250 Volt Motors

H.P.		Speed
1	3 Crocker-Wheeler	1350
3	3 Fairbanks-Morse	1800
1	3 Ideal, interpole	1150
1	3 Northern	1100
1	3 Watson	800
4	3 Thompson-Ryan, interpole	775
1	3 Western Elec.	550
1	3 Triumph	425
1	3 Thompson-Ryan, interpole	375
1	3½ Fairbanks-Morse, interpole	1625
1	3½ Western Elec.	1050
1	3½ Jantz & Leist, fully encl.	900
1	4 Fairbanks-Morse, comp.	1450
1	4 Hertner	1250
1	4 Thompson-Ryan, interpole	900
1	4 Northern	820
2	5 Fairbanks-Morse	1700
1	5 Gen. Elec.	1650
3	5 Gen. Elec., interpole, type CVC	1650
1	5 Northern, comp.	1600
1	5 Gen. Elec., interpole, type RC	1150
1	5 Imperial, comp.	1100
1	5 Western Elec.	1100
2	5 Western Elec.	1100
1	6 Bartz-Wygand & Brown	1475
2	6 Westinghouse, type S	1465
1	6 Northern, type S	1200
1	7½ Western Elec.	1475
1	7½ Watson	1350
1	7½ Roth	1170
1	7½ Ideal, interpole	1150
1	7½ Peerless	1115
3	7½ Sprague-Lundell	1050
1	7½ Westinghouse, type S	975
2	7½ National	900
1	7½ Browning	875
1	7½ Western Elec., interpole	850
1	7½ Gen. Elec.	825
4	7½ Gen. Elec., interpole, type CVC	825
1	7½ Crocker-Wheeler	775
1	7½ Crocker-Wheeler	775
1	7½ Gen. Elec., series, full load speed	750
1	7½ Sprague-Lundell, comp., printing press motor	140
1	10 Robbins & Myers	2100

220 to 250 Volt Meters

H.P.		Speed
1	10 Richmond	1200
1	10 Northern, series, crane or hoisting motor	1200

220 to 250 Volt Motors

HP.		Speed
2	10 Jenney	1060
1	10 Sprague-Lundell	1050
1	10 Gibbs	950
2	12 Thompson-Ryan, interpole	1200
1	20 Jenney, vertical shaft, comp.	1000
1	20 Thompson-Ryan, interpole	1000
1	20 Northern	950
1	20 C. & C. double-commutator, double-speed 250-500	
1	25 Northern, MP. series, crane or hoisting motor, variable speed, full load speed	900
1	25 Northern	650
2	30 Ft. Wayne	1050
1	30 Fisher	585
1	40 Westinghouse	935
1	40 Northern	550
1	45 Holtzer-Cabot	775

500 V. D.C. Motors

HP.		Speed
1	1½ Commercial	1700
1	1½ Peerless, MP, comp.	1045
1	2 Gen. Elec., type CQ	2100
1	2 Northern, MP	1250
2	3 Gen. Elec., type CQ	1800
1	3 Gen. Elec., type CQ	1350
1	5 Ft. Wayne, type MP	1500
1	7½ Browning, MP	1525
1	20 Jenney, MP, vertical shaft, comp.	1250
1	50 Westinghouse, MP, type S, comp.	825
1	110 Ft. Wayne, 6-pole, type LB, comp.	600

Single Phase, 60 Cycle A.C. Motors

H.P.	110 or 220 Volts	Speed
2	⅛ Wagner, type SA, Model SW	1750
1	½ Wagner, 110 v., direct connected to Enterprise coffee mill, complete	1750
1	½ Hobart electric coffee grinder and pulverizer, 110 v.	1750
1	½ Westinghouse, type CA	1725
6	½ Wagner, type 7X7BA,	1710
1	½ Westinghouse, type A	1700
3	½ Jenney, type S, repulsion, vertical shaft	1200
3	½ Jenney, type S, repulsion, vertical shaft, variable speed, new, with C-H Bull. 9310 controllers	1200
8	½ Gen. Elec., type SA, form SKI (clutch type)	1200
10	½ Gen. Elec., type SA form S8I	1200
1	½ Wagner, auto, Mod. BA.	1750
6	½ Century, auto	1165
1	1 Peerless, repulsion type	1750
1	1 Wagner, type SA, Model SY	1750
3	1 Century, auto	1750
6	1 Gen. Elec., type RI	1200
8	1 Century, auto	1165
1	1 Gen. Elec., type RI.	510
2	2 Gen. Elec., type KS, form CG	1800
5	2 Gen. Elec., type RI.	1800
2	2 Wagner, auto, Model A	1750
2	2 Wagner, auto, Model B	1750
3	2 Century, auto	1750
5	2 Century, auto	1165
1	2 Wagner, type BA	1165
2	3 Wagner, auto., Model A	1750

Single Phase, 60 Cycle A.C. Motors

H.P.		Speed
1	3 Wagner, type BK (unity power-factor)	1750
1	3 Wagner, type 11TBA,	1750
3	3 Gen. Elec., type RI	1800
1	3 Wagner, auto., Mod. A	1165
1	3 Gen. Elec., type SCS, form GBR, variable speed, repulsion type,	
3	3½ Century, auto.,	1165
5	5 Gen. Elec., type RI.	1800
3	5 Wagner, auto, Mod. Z	1750
1	5 Wagner, auto., Mod. BA	1750
1	5 Century, auto	1750
1	20 Wagner, type BL., repulsion, variable speed, intermittent duty elevator motor, 220 v., with C-H controller	870

Three Phase, 60 Cycle A.C. Motors

H.P	220 or 440 V.	Speed
1	5 Westinghouse, type CCL v., direct-connected to size 1½ Advance single-stage centrifugal pump (cap. 70 gals. per min. against 100-ft. head)	1700
9	5 Gen. Elec., type KT, form C	1200
4	7½ Fairbanks-Morse	1800
3	7½ Howell Elec. Co.	1800
1	7½ Westinghouse, type CCL	1700
1	7½ Westinghouse, type CCL, vertical shaft on pedestal	1700
2	7½ Gen. Elec., form K	1200 600-1200
1	7½ Howell Elec. Co.	1200
1	7½ Wagner	1140
2	7½ Allis-Chalmers	1130
2	7½ Westinghouse, type CX	1120
3	7½ Fairbanks-Morse	900
1	7½ Gen. Elec., form K	900
1	7½ Gen. Elec., type K, back-geared	1200-300
2	10 Gen. Elec., type K.	1800
2	10 Gen. Elec., type K.	1800
2	10 Howell	1800
1	10 Richmond	1720
1	10 Westinghouse, type CCL	1700
2	10 Howell Elec. Co.	1200
1	10 Gen. Elec., form K.	1200
1	10 Allis-Chalmers	1130
1	10 Richmond, 220 v	1120
1	15 Gen. Elec., type K.	3600
1	15 Gen. Elec., type K.	1800
1	15 Westinghouse, type CCL	1700
1	15 Howell	1200
1	15 Richmond	1140
1	15 Gen. Elec., form K.	900
1	15 Gen. Elec., form M, slip-ring, variable speed	900
2	15 Gen. Elec., form M, 220 v., slip-ring, variable speed	720
1	18 Gen. Elec., type ITC, form M. intermittent duty, slip-ring, new, var. speed	630
1	20 Howell	1800
1	20 Fairbanks-Morse	1200
1	20 Howell	1200
3	20 Allis-Chalmers	1130
1	20 Fairbanks-Morse	900
1	20 Allis-Chalmers	575
2	25 Gen. Elec., form K.	1200
1	30 Fairbanks-Morse	1800
1	30 Westinghouse, type CCL	1700
1	30 Gen. Elec., form A (wound rotor)	900
1	35 Geu. Elec., type KT.	1200
1	35 Gen. Elec., form L (wound rotor	1200
1	35 Gen. Elec., form K.	900
3	50 Gen. Elec., form K, direct-connected to Union Pump Co. centrifugal pumps, 10 in. intake, 8 in. discharge, capacity 1600 gals. per min., 75-ft. head	1750
2	50 Westinghouse, type CCL	1120
1	75 Allis-Chalmers, vertical shaft	490
1	150 Gen. Elec., form K.	720
1	300 Gen. Elec., type ITC, form M. slip-ring, intermittent duty, with self-starting type MC-T3-A contactor-panel and grid resistance, and with extra rotor	600

GREGORY ELECTRIC CO.
16TH AND LINCOLN ST
CHICAGO, ILLINOIS
Capital and Surplus, $500,000.00

NEW MOTORS USED

We carry the largest stock in the East and are prepared to ship almost any requirement instantly from stock.

WE CAN SHIP TONIGHT

any size motor up to 150 H.P. in 3 phase 60 cycle 220 volts, 440 volts or 550 volts.

Our stock of 110 volt, 220 volt and 500 volt direct current motors is complete.

FRANK RIDLON CO.

BOSTON, MASS.

SELECTIONS FROM OUR STOCK

of Turbines, A. C. and D. C. Direct Connected Sets, Motor Generator Sets and Transformers

Let us know your requirements, as we carry a large stock of various classes of electrical machinery other than the items mentioned below.

TURBINES

1—250 KW., 3600 r.p.m., 3-phase, 60-cycle, 440-volt Crocker-Wheeler NEW generator (NO TURBINE INCLUDED).

A. C. DIRECT CONNECTED UNIT

1—30 KW, 300 r.p.m., 220-volt, 3-phase, 60-cycle, General Electric generator, direct connected to a 11½x12 Skinner engine with belted exciter.

D. C. DIRECT CONNECTED SETS

500 VOLTS

1—75 KW., 270 r.p.m. General Electric generator to a 10 and 17 x 12 tandem compound Ames engine.

250 VOLTS

1—15 KW., 400 r.p.m., Sturtevant vertical set, 7x7.

1—30 KW., 300 r.p.m., NEW General Electric (generator only), type "LC."

1—30 KW. Westinghouse to a 9x12 straight line engine.

1—30 KW. Sprague, 300 r.p.m., to Harrisburg engine.

1—100 KW. General Electric, form "L", shunt wound generator direct connected to a New York Safety Engine, 12x14".

1—100 KW., 250 r.p.m., General Electric, form "L" generator direct connected to a 14x15 Ames engine.

1—300 KW., 150 r.p.m. General Electric generator direct connected to a 20 and 34x28 Fitchburg 4-valve engine.

125 VOLTS

2—7½ KW. Westinghouse turbo generators—new.

2—10 KW. Westinghouse turbo generators—new.

1—15 KW. General Electric Marine Set.

1—27 KW. Bullock to a Haring engine.

2—30 KW. Sprague to 8x12 Buckeye engines.

1—50 KW. Westinghouse interpole to a 11½x12 side crank Harrisburg engine.

1—75 KW. General Electric to a 13x12 Harrisburg "Ideal" engine.

MOTOR GENERATOR SETS

1—85 amp., 5 volt to 220 volt, Crocker-Wheeler. 1575 r.p.m., Crocker-Wheeler dynamotor.

1—104 amp., 26 volt to 110 volt, General Electric type "C."

1—220-volt Lincoln Dynamotor to 1100 amp., 5 volt, 400 r.p.m.

1—800 amp., 5-6 volt, 1200 r.p.m., 4000 watts, Hanson-Van Winkle plating dynamo, direct connected to a 7½ h.p., 220 volt, 1200 r.p.m., 2 phase, 60 cycle, Crocker-Wheeler motor. One 5-15 h.p. Westinghouse compensator.

1—30 KW., 1200 r.p.m., 2300 volt, 2 or 3 phase, 60 cycle, type "AQB" General Electric alternator direct connected to a 45 h.p. 250 volt type "CL" General Electric generator, common base. 3-bearing outfit.

1—40 KW., 500 volt generator to be mounted on bed plate, and one 60 h.p., 220 volt, 2 phase, 25 cycle, 720 r.p.m., Westinghouse motor. Can be connected 3-phase.

1—50 KW., 250-volt Siemens-Halske rotary, complete with 2 General Electric, 2200-volt, air-cooled transformers.

1—100 KW., 250-volt, 580 r.p.m., Westinghouse generator, excellent second hand condition, and one 150 H.P., 3-phase, 60-cycle, 220-volt, 580 r.p.m., slip ring type "M," General Electric motor, NEW, with coupling, rheostat and starting apparatus.

1—225 KW., 550-volt, 450 r.p.m. General Electric generator direct-connected to a 250 kw., 2-phase 60-cycle Westinghouse motor.

2—250 KW., 550-volt, 450 r.p.m., Westinghouse Generators, connected to 320 h.p., 2200-volt, 2 or 3 phase, 60-cycle, Stanley Alternators.

1—250 KW., 550-volt, 450 r.p.m., Bullock Generator, direct-connected to a 370 h.p., 2200-volt, 3-phase, Bullock alternator.

TRANSFORMERS

SINGLE PHASE

Qu.	Kw.	Make	Cy.	Type	Voltage
1	1	G.E.	60	H	1040x52/104
1	1	G.E.	60	H	127x110
1	1	G.E.	60		500x200
1	5	Pittsburgh	60		1500/3000x110
1	7½	G.E.	60	H	1040/2080x104/208
1	8	American	60		500x200
1	10	G.E.	60	H	1040/2080x52/104
5	10	G.E.	60	H	1040/2080x104/208
4	15	G.E.	60	H	1040/2080x104/208
1	20	G.E.	60	H	1040/2080x104/208
1	25	G.E.	60	HE	1040/2080x104/208
1	25	G.E.	60	H	1040/2080x104/208
3	30	G.E.	60		1100/2200x220/440 260.00
2	100	Westinghouse (water-cooled)			11000x2500
2	110	Westinghouse (water-cooled)	60	OISC	2200x1800/36
3	200	Westgh.	29	OISC	22000/x41
1	250	Westgh.	60	OISC	13200x22x4440
1	375	Westgh.	60	OISC	2300 4000

THREE PHASE

6	5	Westgh.	60	ST	2100/2200x220/440
4	5	G.E.	60	HT	2080Yx230/460
1	7½	G.E.	60	HT	2080Yx230/460
2	15	Westgh.	60	ST	2100/2200x220/440
2	30	G.E.	60	HT	2080Yx230/460

GEORGE SACHSENMAIER CO., **Office and Salesrooms: 141-43-45 N. 3rd St., Phila.**

Warehouse: 928-30-32 No. 3rd St.

LET US KNOW WHAT YOU HAVE FOR SALE

ONE YEAR GUARANTEE NATHAN KLEIN & CO., Centre & Howard Sts. NEW YORK

That's the way we sell all our motors. You take no chances.

Electric Hand Drills

Size	Make	Cycle	Phase	Volts
3/8"	G.E.	60	1	110
6½"	Van Dorn	60	1	110

Low Voltage Plating Dynamos

Amp.	Make	Speed	Volts
800	World	1200	6
800	Hanson Van W.	1250	5 & 6
500	Hanson Van W.	1250	6
400	Hanson Van W.	1200	6
150	Hanson Van W.	1200	5
120	Hanson Van W.	1125	5
100	Connecticut	1800	6

Ventilating & Exhaust Fans

			Volts
30"	Diehl	D.C.	220
30"	Sprague	60 Cy. "KS" 1 Ph.	110
2-30"	Sprague	D.C.	220
1-36"	Sprague		220
*2-24	Whse.	D.C.	220
30-18	G.E.	D.C.	110*
16-18	G.E.	A.C. 1 Ph.	110*
4-16	G.E.	D.C.	110
12"	Whse.	D.C.	110
400-16"	Misc.	D.C.	110

New.

110-125 Volt, D.C. Motors

H.P.	Make	Wdg.	Spd.	Type
⅛	Cr.-Wh.		1800	
¼	Emerson		1200	
¼-½	Peerless		1675	
¼	R.M.		1750	
½	H.C.		900	
½-¾	G.E.	Sh.	1500	CQ
¾	Universal	Sh.	1760	
1	Milw.	Sh.	500/600	B2
1	Jenny		1800	
1	Sprague		1750	Open
1 Kw.	Peerless		1720	
1½	F. & M.		1500	Back geared
1½	Diehl	Sh.	400	
1½	Eck.	Sh.	475	
1½	Peerless	Sh.	1550	
2¼	Whse.		1800	
1-2	G.E.		1700 new	RC*
2	H.C.		1800	
2	F. & M.		1200	
2 Kw.	C. & C.		1150	
2	Diehl		990	
2	G.E.		1700	DSD
2	Cr.-Wh.		600	
2	Cr.-Wh.		400	CM
2	Sprague		800	
3 Kw.	Northern		1950	
3	G.E.		1100	CI
2-3	Sprague		1300	CI
3¼ Kw.	Whse.		1125	
4	Bernard		1450	
5	Conn.		1250	
7½	G.E.		1700	RC
8½	Edison		1200	
8½ Kw.	W.E.		1100	
9 Kw.	Diehl		1150	G
10	Diehl		850	G
12	C. & C.		825	
12½ Kw.	Sprague		900	
12½	W.E.		1000	MP
13	W.E.		875	S
14 Kw.	G.E.		1500	CQ
15	Whse.		875	S
15 Kw.	C. & C.		600	
17½ Kw.	G.E.		1175	
20 Kw.	Whse.		600	MP
25 Kw.	Edison D.C. Bi Polar			
2-25	Whse.	Sh.	850	S
30 Kw.	Akron		800	SP
30	Eddy		675	G
30 Kw.	G.E.		720	CLB
30 Kw.	S.-H.		1000	
30	Milw.		600	B
40 Kw.	F. & M.		1000	
50	Milw.		525	
75 Kw.	Whse.		800	

*New.

230-250 Volt, D.C. Motors

H.P.	Make	Wdg.	Spd.	Type
¼	Sprague	Sh.	1460	
24-¼	Cr.-Wh.	Sh.	1720	
3-¼	Cushman		420	
¼	Eck.		1350	
¼	Peerless		1500	
¼	Hlt. Cbt.		1800	
2-½	Peerless	Sh.	420	
5-½	G.E.		1700	DSD*
½	Lundell		1700	
½	Diehl		1725	
½	Sprague		500	RT
¾	G.E.	Ser.	1600	CQ
¾	Whse.		925	
1	R.M.	Ser.	1500	
1	Conn.		600	
1	Sprague		1200	
4-1	G.E.		1700	DSD
1	R.M.		1300	
2-1	G.E.		1700	RC*
3-1	G.E.		1700	DSD*
1½	Cr.-Wh.		1650	
2	Roch.	Comp.	1225	
2	Ideal		3700	
6 Kw.	Whse.		1675	
2	G.E.		500/1500	CQ
2	C. & C.		375	
2-2	Eck.		1275	
2	Peerless		1750	
2	Cr.-Wh.		1600	CM
2	R.M.		1575	
2	Watson		1700	
2½	Comm'l		1175	
3	Whse.		1800	S
3	Sprague		500/1000	C
3	Whse.		750	
3	G.E.		1800	
3	Sterling		360	
12	C. & C.	Sh.	1520	S
11	Whse.		750	
3	C. & C.		1460	
4	G.E.		375/925	CE
5	Al.-Ch.		1200	Close
5	G.E.		1100	CQ
5	W.E.		390*	
6	W.E.	Sh.	1100	Open
6	Whse. Comp.		1150/1700	SK*
6	Cr.-Wh.		700	Open
7½	Bell		1100	
7½	C. & C.	Sh.	1280	Open
7½	Eddy	Sh.	1000	A
8	G.E.	Ser.	1250	
10	G.E.	Sh.	570	CE
10	Cr.-Wh.		850	F
10	Whse.		1325	S
10	Diehl		750	
10	Eddy		1000	
11¼	Ft. Wayne		600/1200	
12½	C. & C.		800	
12½	W.E.		1240	
15	Whse.	Sh.	1575	
35	C. & C.		900	Open
45	C. & C.		600	
50 Kw.	C. & C.		650	MP
60	Sturt.	Sh.	427	
60	G.E.		485/850	DLC*
10	New Eng.		1175	

*New.

500-550 Volt, D. C. Motors

H.P.	Make	Wdg.	Spd.	Type
½	Cr.-Wh.		1740 new	
1½	Sprague		920	
2	Peerless		940	
2	W.E.		1750	Open
3	Cr.-Wh.		1900	
3	G.E.		2000	CQ
3	Cr.-Wh.		1900	CCM
3	Whse.		1800	SK*
4	R.M.	Sh.	1200	Close
5	G.E.		2000	
5	G.E.		500	CE
5	Peerless		1330	
6	W.E.	Sh.	1100	
6	W.E.		1225	
7½	C. & C.	Sh.	1400	
7½	G.E.	Sh.	990	CE
7½	Bernard	Sh.	1450	
10	Whse.		1250	MP
12½	Whse.	Sh.	650	S
15	Peerless		2150	
20	G.E.	Comp.	1125	B
25	G.E.	Sh.	650	
30	Triumph	Sh.	950	
30 Kw.	C. & C.	Comp.	940	SL
30	C. & C.	Comp.	350	MP
10	G.E.		1400	

Single Phase, 60-Cycle Motors

H.P.	Make	Spd.	Type	Volts
1/20		1700		110
¼	Holt. Cbt.	1700		110
23-¼	Whse.	1700		110
¼	Emerson	1150		110
¼	Holt. Cbt.	1800		110
¼	G.E.	1800	KS	110
¼	Whse.	1725	CA	110
¼	Wagner	1150	BA	220
¼	G.E.	1800	KS	110
30-¼	Emerson	1700		110
7-¼	Whse.	1150		110
⅓	Holt. Cbt.	1330		110
⅓	Whse.	1440	CA	220
⅓	Ft. Wayne	1800	SA	110
4-⅓	Emerson	1150		110
½	Emerson	1150		220
½	G.E.	1200	KS	110/220
½	G.E.	3400	KS	110
2-½	Wagner	1800		108
½	Emerson	1700		110
¾	Bell	1165		110/220
¾	G.E.	1780	RI	110/220*
2-½	Century	1750		110/220
1	G.E.	1800	KS	220
1	Century	1165		110/220
1	Wagner	1750		110/220
1	G.E.	1800	KS	110
1	Bell	1800		110
5-1	Wagner	1700		110/220*
1	Bell	1200		220
2-1	G.E.	1770	RI	110/220
2-3	Wagner	1750	SA	110/220*
2	Century	870		110/220
2	Whse.	1710	A	104/208
3-2	G.E.	1800	KS	110
2	Wagner	1170		220
2-2	G.E.	1750	RI	110/220
2	Bell	1800		220
3	Whse.	1750	AR	110/220*
2-5	Century	1750		104/208*
5-5	Wagner	1750	BA	110/220*
5-7½	Wagner	1800	BA	110/220*
3	Bell	1200		110/220
3-3	G.E.	1800		110/220
2-5	G.E.	1800	KS	110/220
2-5	Bell	1800		110/220
10	Wagner	1750		110/220*
7½	G.E.	1800	KS	220

*New.

2-Phase, 60-Cycle Motors

H.P.	Make	Spd.	Type	Volts
4½	G.E.	1200	Sq.Ca.	110/220
½	Wagner	1120		220
½	R.M.	1750		220
2½	G.E.	1800	IQ	110
2½	Whse.	1700	CCL	220
2½	Whse.	1700	C	220
2-1	Whse.	1725	Sq.Ca.	220
2-1	Wagner	1750	Sq.Ca.	220
1	R.M.	1750	Sq.Ca.	220
2-1	G.E.	1800	Sq.Ca.	110
2-1	Whse.	1700	CCL	220
1	G.E.	1800	KQ	220*
2	Bell	1200		220
2	G.E.	1800	KQ	220
2-2	Whse.	1700	CCL	220
2	Richmond	1720	FH	220
3-2	G.E.	1200	KQ	220
2	West.	1750	CSA	220
4-2	G.E.	1800	KQ	440
2-2	G.E.	1800	KQ	110*
58-2	Whse.	1120	CS	220/440
2	Al.-Ch.	1130		220
2	F. Morse	1800	Sq.Ca.	220
2	Cr-Wh.	1700	Sq.Ca.	220
2	Wagner	1140	Sq.Ca.	220/440
3-3	G.E.	1800	KQ	220*
4	Whse.	1200	Sq.Ca.	220
20	Wagner	850		220/440
3-2	Cr.-Wh.	1710	Sq.Ca.	220
2-2	Whse.	1725	CS	220*
2-3	G.E.	1200	KQ	440-220
3	Richmond	1720		208
3	G.E.	900	L	220
3	Richmond	1800	Sq.Ca.	220
3	Whse.	1120	CCL	220
5	Al.-Ch.	1700		220
5	Mech.App.	1740	K	220
4-5	G.E.	1800	KQ	220
2-5	Whse.	1120	Sq.Ca.	220
5	Cr.-Wh.	1200	Sq.Ca.	220
5	G.E.	1800	K	440
6-5	Whse.	1700	CCL	220
5	Al.-Ch.	1700		220
5	Whse.	1120	CCL	220
5	Wagner	1750	BP	440-220*
5	R. & M.	1750	K	220*
3-7½	G.E.	1800	KQ	220
7½	Whse.	1700	CCL	220
7½	Richmond	1720		220
3-7½	W.E.	1800	CL vertical	220
2-10	Whse.	1140	Slip ring	220
2-10	Whse.	1740	CS	220
10	Whse.	1715	Slip ring	220
2-10	Whse.	1140/220	sl. rg.	
10	Whse.	860	C	220
15	G.E.	1200	KI	220
15	Willy	1740		220
2-15	Whse.	865	Slip ring vertical	220
15	Whse.	860	HF	220
15	Whse.	1700	CCL	220
15	W.E.	1145	Sq.Ca.	220
3-20	Whse.	850	CCL	220
3-7½	G.E.	1800	KQ	220*
2-7½	Whse.	1700	CCL	220
10	R. & M.	1750	IC	220*
25	Wagner	1140	Slip ring	220
25	Willy	1140	Sq.Ca.	220
25	Phoenix	1200	Sq.Ca.	220
28½	Union	900		220
40	Whse.	1120	CCL	220

*New.

3-Phase, 60-Cycle Motors

H.P.	Make	Spd.	Type	Volts
10-½	W G.E.	1800	DST	220
2-¼	Wagner	1720		220
2-¾	G.E.	1800	DST	220
8¼	Whse.	850		220
2¾	Whse.	1140	CS	220*
5½	G.E.	1800	K	220
2½	G.E.	1800	Sq.Ca.	220
2½	G.E.	1800		220
¼	Wagner	1720	Sq.Ca.	220
¾	Whse.	850	Sq.Ca.	220
¾	G.E.	1200	KT	220
2¼	Whse.	1140	CS	440*
1	Cr.-Wh.	1800	Sq.Ca.	220
1	G.E.	1200	Sq.Ca.	220
1	F. & M.	1200	Sq.Ca.	220
2-1	G.E.	1800	Sq.Ca.	110
1	G.E.	1800		220
39½	Whse.	1140	CSA	220/440*
9-¾	Whse.	1140	CSA	220/440*
3-2	Whse.	850	CS	220/440*
4-2	Whse.	850	CS	440*
58-2	Whse.	1200	CS	220/440*
2	G.E.	900	KT	220
2-2	G.E.	1800	K	220
2	Richm'd	690	Sl. rg.	220
5-2	Whse.	850	CS	440*
2-2	Whse.	1120	CS	440*
6-2	G.E.	1200	K	220/440
20-3	Whse.	850	CS	440*
3	Willy	1140	Sq.Ca.	220
3-3	Whse.	850		220
2-3	R. & M.	1800	K	220
3	West.	1750	CCL	220*
3	G.E.	900	Sq.Ca.	220
3-3	G.E.	1200	K	220
3-3	G.E.	1800	K	220
3	Whse.	850	CS	440*
3	Allis-Ch.	1130	Sq.Ca	220
3	Whse.	850	CS	440*
5	G.E.	1200		220
5	Whse.	850	CS	440*
5	Whse.	1700		220
2-5	Whse.	485	CS	220/440*
5	F. & M.	1200	B	220
5	Whse.	1735	CS	440*
5	Lincoln	1200	KT	220
5	Whse.	1700	CCL	220
2-5	G.E.	1800	KT	220
5	F. & M.	1800	Sq.Ca.	440
5	Rich.	1700	Sq.Ca.	220
3-7½	Watson			1750/220*
-7½	Allis			1750/220*
7½	Wagner	1730	BP	220/440
7½	Whse.	1740	CS	220/440*
2-7½	Whse.	485	CS	220/440*
2-7½	G.E.	1800	K	220
7½	Ft. Wayne	1200	MA	220
7½	G.E.	900	K	220
7½	Wagner	1720	Sq.Ca.	440
7½	Willey	1750	Sq.Ca.	220
7½	Whse.	1700	CCL	220*
7½	Whse.	1800	C	220
7½	Whse.	1200	F	220
7½	Wagner	1800	Sq.Ca.	220
3-10	Whse.	1740	CS	440*
10	G.E.	1200	L	220
10	G.E.	1200	K	220
10	West.	1700	Sq.Ca.	220
3-10	G.E.	1800	Sq.Ca.	220
10	G.E.	1160	KT	220
12	G.E.	720	IK	220
15	Whse.	1135	CCL	220*
2-15	G.E.	1800	KT	220
2-15	G.E.	1200	KT	220
15	W.E.	685	Sq.Ca.	2200
2-15	G.E.	1200	L	2200
15	W.E.	1200	K	220*
15	Wagner	1140	Sq.Ca.	220
20	Whse.	690	HF	220
20	Whse.	1700	CCL	220*
20	G.E.	1800	K	440
20	Mech.Ap.	1140	Sq.Ca.	220
20	Whse.	1740	CS	220*
25	Whse.	1200		220
25	G.E.	900	K	2200
25	Whse.	3450	CS	440*
2-25	Whse.	900	CS	220/440*
30	Whse.	1750	CS	220*
30	Whse.	1200	KT	2200
30	G.E.	1200	Sq.Ca.	220
2-30	Whse.	1165	CW Sl. rg.	220
40	Whse.	1735	CS	440*
2-40	G.E.	1800	K	220
40	G.E.	900	K	2200
40	Allis-Ch.	1160	Sq.Ca.	440
2-40	G.E.	1800	K	220
40	G.E.	1200	KT	2200
50	G.E.	1800	K	220
2-20	G.E.	1800	M	220
50	Whse.	1755	CS	220*
2-50	Whse.	1700	CCL	2200*
2-50	G.E.	900	M	220
35	G.E.	875		220
35	G.E.	1150		220
35	G.E.	600		220
50	Wst. Elec.	900	L	220
50	Whse.	1140	CCL	220*
50	Whse.	850	CCL	220*
75	G.E.	1200	K	2200
75	Whse.	1755	CS	220*
75	Lincoln	1800	KT	440
75	G.E.	514	L	220
150	G.E.	720	M Sl. rg.	440
150	G.E.	600	K 440 vertical	
150	Whse.	700	CCL	2200*

1—150 Kw. Stanley, 2-phase, 60-cycle, 2400 volts, 900 r.p.m., Generator.

1—100 H.P. G.E. 3-phase, 60-cycle, form L, 440 volts, 600 r.p.m.

2 direct current hoist motors, series wound, type A, 75 h.p., 220 volts.

2-½	R. & M.	1400	440
½	G.E.	500	220
1	G.E.	1500 KT	220
2-7½	Whse.	1400 CS	440
10	F. & M.	750	440
15	Whse.	710	220
20	G.E.	1500 K	220
50	Whse.	720	220

Hoists

8 d.c. Maine, G. E. Electric Hoist, connected to 50 h.p., d.c., 220-volt motor.

1 Maine G. E. Electric Hoist, direct connected to 50 h.p., a.c., 440 volt, 3-phase, 60-cycle motor.

1 Maine G. E. Electric Hoist, direct connected to 30 h.p., a.c., 440-volt, 3-phase, 60-cycle motor with five swinging gears.

Transformers

2 General Electric Transformers, Nos. 56166-56167, type "I," form RT, 60-cycle, 6600-6270-2700 volts.

ELECTRIC MOTORS Largest Stock in America

Send for our Monthly Bargain Sheet of 1000 other Items.

Direct Current Motors 220-250 V

No.	H.P.	R.p.m.	Wdg.	Type	Make
3	5	1850	Sh.	CM	Cr.-Wheeler
1	5	1870	Sh.		Gen. Electric
1	5	1700	Sh.	CVC	Gen. Electric
1	5	1700	Sh.		Imperial
1	5	1650	Sh.		Gen. Electric
1	5	900	Sh.	A-5	Gibbs
1	5½	1675	Sh.	CVC	Gen. Electric
1	7½	1425	Sh.		Cr.-Wheeler
1	7½	585	Cp.		Northern
1	15	875	Sh.		Imperial
1	15	800	Sh.		Cr.-Wheeler
1	15	660	Sh.		Northwestern
1	15	625	Sh.	CVC	Gen. Electric
1	15	625	G.		Eddy
2	17½	585	Sh.	A-14	Gibbs
2	20	975	Sh.	TR	Fairbanks-Morse
1	20	1150	Sh.	TR	Fairbanks-Morse
1	20	800	Sh.		Imperial
1	20	600	Sh.		Gen. Electric
1	20	650	Sh.		Milwaukee
1	20	600	Sh.		Western Elec.
1	22	710	Cp.	C	Keystone
1	30	950	Sh.	CS-20	National
1	30	630	Sh.		Northwestern
1	30	575	Sh.	K	Allis-Chalmers
1	38	590	Sh.		Gibbs
1	40	675	Sh.		Northwestern
1	40	620	Sh.		Western Elec.
1	40	575	Sh.	A-30	Milwaukee
1	40	550	Sh.	M	Westinghouse
1	50	625	Sh.	A-40	Milwaukee
2	50	1200	Sh.	TR	Fairbanks-Morse
1	55	575	Sh.	6½AOR	Western Elec.
1	60	600	Co.		Milwaukee
1	75	850	Sh	MP	Milwaukee
1	75	850	Cp.	MP	Milwaukee
1	85	750	Cp.	CL-65	Gen. Electric
1	120	450	Cp.	MPA	G. E.
1	300	160	Sh.	M	Westinghouse

ELECTRIC FANS

No.	Type	Size	Volts	New or Used	Make	Price Each
4	S&T	9"	110	A.C. New	Cr.-Wh.....	$8.00
1	OSC	12"	110	D.C. Used	G.E.....	13.00
9	S&T	12"	110	D.C. Used	West.....	10.00
2	OSC	16"	110	D.C. Used	Shed Elc....	14.50
2	OSC	16"	110	D.C. Used	West.....	14.50
6	OSC	16"	110	A.C. New	Jandus.....	18.00
1	S&T	16"	100-115	D.C. Used	West.....	12.00
1	OSC	12"	110	A.C. New	Jandus.....	15.00
8	Ceiling	15"	110	D.C. Used	Gyrofan.....On Ap.	
1	Ceiling	16"	110	D.C. Used	Diehl.....On Ap.	
10	S&T	12"	110	A.C. New	Jandus.....	13.50

EXHAUST FANS

No.	H.P.	Size	Volts	New or Used	Make	Stock No.
1	1¼	24"	230	D.C. Used	Northwest	B-645
1	..	24"	110	D.C. Used	Lackman	B-646
3	1.85	30"	230	D.C. Used	Northwest	B-647

Prices on Application

We carry a complete stock of engine generator sets, motor generator sets and A.C. motors ranging from 1 to 200 H.P.

Send for our complete list

DUQUESNE Electric & Mfg Co.

Write, wire or 'phone our nearest office;
PITTSBURGH, PA., or 230 S. LaSalle St. CHICAGO, ILL.

Mill Type Motors

4—200 H.P., 220 Volt D.C. Westinghouse MT No. 7, 480 R.P.M., compound wound.

2—100 H.P., 220 Volt D.C. Sturtevant, 290 R.P.M., 8 pole, shunt wound.

2—90 H.P. Sprague, 220 V. D.C., 210 R.P.M., 6 pole, compound wound.

2—60 H.P. Sprague, 220 Volt D.C., 6 pole, compound wound.

HONESTLY ELECTRICAL REBUILT APPARATUS

Miller-Owen Electrical Company, Inc.
Pittsburgh, Pa.

"Pittsburgh's Electrical Clearing House"

3 PHASE 25-CYCLE MOTORS

Quan.	HP.	Volt	RPM.	Delivery
8	1	220-440	750-1500	Immediate
16	2	" "	" "	"
8	3	" "	" "	"
21	5	" "	" "	"
14	7½	" "	" "	"
1	10	" "	1500	"
8	15	" "	750	"
6	20	" "	"	"
9	25	" "	"	"
*5	125	440	1500	"
2	75	2200	750	"

3 PHASE 60-CYCLE MOTORS

Quan.	HP.	Volt	RPM.	Delivery
68	1-5	220-440	900-1800	Immediate
29	7½-10	" "	" "	"
14	15	" "	" "	"
2	20	" "	1200	"
5	25	" "	900-1800	"
5	30-50	" "	" "	"
1	75	440	720	"
2	150	2200	600	"

All of the above motors are new, with exception of motors marked with an asterisk, and are of the Western Electric, General Electric and Lincoln makes.

A. J. DOTTERWEICH CO., Inc.
285 Washington St. Buffalo, N. Y.

Direct Current Motors — Dynamos

220 VOLTS

HP	Make	Speed
15	Westinghouse SK.....	850
10	Sprague Interpole.....	500 to 700
25	General Electric.....	400
25	Western Electric.....	600
15	Jenny Interpole.....	500 to 1200
15	Westinghouse	375 to 1000
8	KW General Electric connected to steam eng. Several smaller ones.	

110 VOLTS

HP	Make	Speed
50	General Electric.....	850
25	Crocker-Wheeler compound	700
20	Northern	650
12	Western Electric.....	300 to 600
10	KW General Electric connected to steam eng.	
10	General Electric.....	500
4	Westinghouse SK.....	400 to 800
3	KW C-W connected to steam eng. Several smaller ones.	

GEORGE BENDER
130 Centre Street NEW YORK

A. C. Units

165 K.V.A. Crocker Wheeler 60 cycle Alt., dir. con. Harris Corliss Engine, with condenser and exciter.....$6250

135 K.V.A. Wghse. 60 cycle Alt., dir. con., 16 x 17 Ridgway Latest Type Engine, with exciter and switchboard $4000

Power Machinery Exchange, Inc.
1 Montgomery St. Jersey City, N. J.

3—500 h.p. (used) 440 volt, 3 phase, 60 cycle, 900 r.p.m. slip ring motors and control, complete with special reduction gears for rolling mill duty. All first class condition.

RALPH E. GARRITY
633 Wabash Bldg. Pittsburgh, Pa.

TURBINES

1—2000 KW., G. E. Curtis-Horiz. Steam Turbo Unit, 3 Ph., 60 Cy., 2300 V., 3600 RPM.
2—780 KW. Westg. Horz. Turbines, 3 Ph., 60 Cy., 2300 V., 3600 RPM., with condensers.
1—500 KW., Westinghouse, 3 ph., 60 cy., 440 V., horiz. turbo unit, 3600 RPM. with or without Surface Condenser.
1—500 KW., General Electric Curtiss Steam turbine, 3 ph., 60 cy., 2300 V., 1800 RPM., 150 lb. steam pressure vertical type.
1—100 KW., Gen. Elec., 3 ph., 60 cy., 2300 V., 3600 RPM., turbo generating set 125 lb. steam pressure.

DIRECT CONNECTED A.C. UNITS

1—800 KW. Allis-Chalmers, 3 ph., 60 cy., 240 or 440 volt, 90 RPM. generator, dir. ctd. to 22 and 44 x 48" Reynolds Corliss engine.
1—200 KVA. Cro.-Wheeler, 2 ph., 60 cy., 1100 V., 200 RPM. alternator dir. ctd. to 18 x 20 Erie Ball engine.

250 VOLT UNITS

1—525 KW. Gen. Elec. MP., 250 V., 100 RPM. generator, dir. ctd. to 20 & 36 x 42" E. P. Allis engine.
1—400 KW. Ft. Wayne, 250 V., 150 RPM. generator, dir. ctd. to 24 x 27" Buckeye engine.
1—125 KW. Westinghouse, 3 wire, 125/250 V., 280 RPM. generator direct connected to a 14 and 24 x 14 Westinghouse engine.
1—100 KW. Western Elec., 250 V., 225 RPM. generator dir. ctd. to 17 x 18 Erie Ball engine.
1—100 KW., 3 wire, Allis-Chalmers, 250 volt unit consisting of 2—50 KW., 125 volt, 275 RPM. generators direct connected to 1—10 and 18 x 12" Reeves engine.
1—37½ KW. Westg., 250 V., 320 RPM. generator, dir. ctd. to 10 x 18 x 10 Westg. vertical engine.
1—15 KW. Allis-Chal., 250 V., 360 RPM. generator dir. ctd. to 7 x 7 Amer. Blower engine.

125 VOLT UNITS

1—62½ KW. Westg., 125 V., 320 RPM. generator dir. ctd. to 10 & 8 x 10" Westg. engine.
1—60 KW. Gen. Elec., 118/120 V., 280 RPM. generator dir. ctd. to 12¼ x 14 Watertown engine.
1—60 KW. Bullock, 120 V., 275 RPM. generator dir. ctd. to 13 x 14 Watertown engine.
1—50 KW. Western Elec., 125 V., 300 RPM. generator dir. ctd. to Russell engine.
2—30 KW. Sturtevant, 125 V., 325 RPM. generators dir. ctd. to Sturtevant engines.
2—20 KW. Diehl, 110 V., 2500 RPM. generators dir. ctd. to 2—35 H.P. Terry Turbines. 85 lb. steam pressure.
1—12½ KW. Bullock, 120 V., 375 RPM. Gen. dir. ctd. to 7 x 7 Amer. Blower engine.

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DIRECT CURRENT GENERATOR

75 KW., form M, 850 r.p.m. General Electric Generator with Rails and Pulley, and Generator, and Distribution Switchboards. Boards complete with Ammeters, Voltmeters, Switches and Circuit Breakers. Outfit in first-class condition. For sale reasonably.

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400 K.W. General Electric Generator, Direct Current, 220 Volts, direct connected to Tandem Compound, Atlas Corliss Engine. Outfit in splendid shape, available for immediate shipment.

LYONS ATLAS COMPANY
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Arc Welding Dynamos

400-500 Amperes
55-60 Volts

General Electric Makes
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BALDWIN & COPELAND
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Direct Connected to

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125 or 250 volt, 3 wire.

Condition like new.

Complete with all apparatus.

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1—Lincoln Electric Company's Electric Car Charging Set consisting of the following:
Motor No. AD 029, Frame IF, H.P. 5, 220 Volt, 1800 RPM, Single Phase, 60 Cycle.
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1—Motor Generator Set as follows:
Motor Wagner, Type 5, Model BA, Cycles 60, 3½ H.P., 1165 RPM., 50/25 Amp., Volts 115-230, Serial No. 26369.
Generator, Western Electric, Type E-20-BS, KW. 2½, Volts 120 DC., Amps. 20.8, 1165 RPM., No. 41430.
1—28" x 30" Blue Vermont Marble Switch Board containing
1—20 Amp. Thomson Amp. Meter. 1—150 Volt Thomson Meter. 1—Field Rheostat.

For Price inquire

HENRY FORD & SON, Inc.
Dearborn, Michigan

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250 volt D. C. UNITS

K.W.	Generator	Engine	Price
300	Wghse.	Hamilton	$6500
250	Wghse.	Hamilton	5500
200	G.E.	Filer Stowell	7000
125	G.E.	Harrisburg	3750
100	G.E.	Harrisburg	3000
75	G.E.	Harrisburg	2250
50	G.E.	Harrisburg	1500

Power Machinery Exchange, Inc.

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559' CABLEWAY EQUIPMENT

Necessary equipment together with 4-drum hoist arranged for motor drive which was used about six months on a 550' span cableway, handling 8-ton capacity, built by Lidgerwood Manufacturing Co. Also new spare parts which cost $2,500.

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Good Condition Prompt Shipment Fair Prices

Electric Double Drum Hoists

2—30 H.P. 6—50 H.P. D. C., 220 volts.
5 Swinging Gears for same.
1—50 H.P., A. C., 3-phase, 60-cycle, 440 volts.

Steam Hoists, Single Drum

1—3"x4". 6—4½"x6" (Swinging Gears).

Steam Hoists, Double Drums (Without Boilers)

1—5½"x8". 1—8"x10".
2—6"x8". 2—8"x12".
1—6"x12". 1—8¼"x10".
2—7"x10" (1 with L. M.) 1—9½"x10" (Link motion).
1—10"x16".

Wire Rope 6/19 Plow Steel

13,465 ft. ¾" (lengths 650 ft. to 2100 ft.).
14,585 ft. ⅝" (lengths 700 ft. to 1400 ft.).
870 ft. ½" (one piece).
4,000 ft. ¾" (never unreeled).
1,200 ft. 1⅜"x2" Plow Steel, Armored Rope. (Waterbury)—Never Used.

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1—40-ton. 4—20-ton. 8—15-ton.

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26 pieces 12"x12", first-class, never used.
6 pieces 14"x14", 30 ft. to 33 ft. lengths.

1—15-ton Locomotive Crane (Wood Derrick Type).

Electric Steel Traveling Cranes, D. C., 220 Volts

1—30-ton, 75-ft. span.
1—15-ton, 40 ft. 9 in. span.
1—15-ton and 5-ton, 60-ft. span.
2—10-ton, 40-ft. span.

Lane Trussed Wood Frame Cranes (Rope Drives)

1—10-ton, 29 ft. 6 in. span.
2—10-ton, 40-ft. span.
2—20-ton, 40-ft. span.
1—10-ton, 50-ft. span.
(Easily changed to electric drives.)

2—G. E. Transformers, Type H, Form R, Top 60-cycle, cap. 75 kw., 6600/6700—2200.

1—Stanley A. C., 2-phase, generator, 135 kw., Type C, 900 r.p.m.

1—S. Morgan Smith, 14" water wheel, complete with case and draft tubes (no governor).

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Ingersoll-Sargent, Class JC, belt-driven, 2-stage, 18¼" and 12¼"x12", 526 cu. ft., at 150 r.p.m.
Hall, steam driven, 16" and 6½"x14", 2-stage, air-cylinders, 14"x14", steam, rated by manufacturers at 500 cu. ft.
Norwalk, steam driven, 16" and 9½"x16", 2-stage, air cylinders, 16"x16", steam cylinders, 558 cu. ft.

1—300 H.P. B. & W. Boiler, with Coppus Blower and guyed steel stack, 87 ft.x60 in.

Steam Engines

1—14"x20" Atlas R. H. Automatic Side Crank Engine, with band wheel, 84"x16".
1—12"x20" Erie City, 4-valve, automatic engine.
1—35 H.P. Buckeye, center crank, automatic engine.
1—6"x12" Sherman, Vertical Engine (Throttling).
2—6"x8" Nagle, Vertical Engine (Throttling).

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1—Worthington Duplex Steam Pump, 5½"—3½x5".
1—No. 7 Pulsometer.

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ONE Two Ton Detroit Hoist & Machine Co.'s Jib Crane with stationary Type "H" Electric Hoist complete with 3 H.P., 220 volt, 60 cycle motor and limit switch. Excellent condition. Used only a short time. $740.00 f.o.b. cars Detroit.

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WHITING Pneumatic Crane Hoist, 37' span, 200' rail and runway. Perfect condition.

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TRAVELING CRANE

30 Tons, 3 Motor, 75' Span, 220 Volt D.C., with 10 Ton Auxiliary Hoist.
Fitted for outdoor service.
170 ft. runway, 29' 6" lift.
Available for inspection and immediate delivery; now operating.

THE PUFFER MFG. CO.
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1—Whiting overhead traveling crane, 20 ton capacity, 40 ft. span, 220 volt, D.C. Immediate delivery. $7,500.

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Full Particulars by addressing

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CRANES

Overhead Electric Traveling Type?

Yes! We have a number of Standard MAKE.

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IMMEDIATE DELIVERY

Capacity 2 to 25 Tons

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Five-Ton Crane

NORTHERN ELECTRIC 30-ft. span, 25-ft. lift, 2 General Electric 550-volt, 3-phase, 60-cycle motors, made up of plate girders, fish belly section; the crane is equipped with a cage, having bridge controller therein; hoist motor operated by ropes from floor; trolley operated by geared hand chain from floor, but motor can be applied; crane 3 years old, good as new, can be seen in operation, will stand overload. Further particulars call Main 3517, Main 3518 or write to

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Traveling Cranes

25 Ton, 55' 1¾" Span, 50' Lift, Cab Control, 3 Motor, 500 Volt D.C.
Practically New. Immediate Delivery

8 Ton, 40' Span, Hand Operated from Cab.

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New. Immediate Delivery.

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New and Used Cranes
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Traveling Cranes

20-Ton NILES 75' Span

3-motor, 220 or 500-volt D.C., 40' lift, girders box fish-belly type, cage control, trolley arranged for auxiliary hoist. Practically new condition. Immediate shipment. Price, f.o.b. cars.....$12,500

3-ton MARIS BROS., 3-motor, 220-volt D.C., 35' span, 30' lift, floor control. Price, f.o.b. cars.....$2,500

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IMMEDIATE DELIVERY
Brand New 3 Motor
Electric Traveling Crane
7½ Ton Capacity 48' 6" Span
TITAN EQUIPMENT CO.
30 Church St., New York
Phone Cort. 1111.

LOCOMOTIVE Cranes, Cars, Locomotives, Steam Shovels, Rails, etc.

A. L. DERRY & CO.
Scranton, Pa.

ELECTRIC CRANES

1—10-ton 40' Span, 230 V. D.C.
1—20-ton 31' Span, 3-Phase, 60-Cycle, 220 V.
2—1-ton Electric Wall Traveling Cranes.
1—1-ton, 2-motor Sprague Hoist.
1—1000-lb., 500-V. D.C. Electric Hoist.
1—1-ton Geared Air Hoist.
1—5-ton Geared Air Hoist.
5—14" 6' Stroke Cylinder Air Hoists.
1—10-ton Geared Air Hoist.

CUPOLAS

1—84" Whiting.
1—Each, Whiting No. 2, No. 3, No. 5, No. 7, No. 9.

LADLES

1—2-ton Reservoir Ladle.
1—5-ton, 4—1-ton Crane Ladles.

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1—8 x 8 Advance, belt drive, 8 x 8 Chicago Pneumatic.
1—6 x 6" Ingersoll, belt drive.
1—1" x 11" Christensen, belt drive.

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1—40" x 6'.
2—48" x 6'.
1—30" x 5'.

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5' x 15' Red—4-head machine.
36 x 36 x 9—1-head Pond.
30 x 30 x 12—1-head Gleason.
42 x 42 x 13' Hill Clark.

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No. 2 Garden City.
Roots No. ½, displacement 1.3 cu. ft.
Roots No. 1, displacement 2.95 cu. ft.
Roots No. 2, displacement 4.8 cu. ft.
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Roots No. 5, displacement 19.6 cu. ft.
Roots No. 5½, displacement 28.2 cu. ft.
Roots No. 7, displacement 61.6 cu. ft.
Connersville, displacement 33 cu. ft.
All sizes Fan Blowers.

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2—Grimes Power Roll Over.
12—Tabor Hand Roll Over.
2—Tabor 24 x 48 Power Squeezers.

SAND BLAST MACHINES

2—Tilghman.
1—Pangborn.
1—Electric Elevator, 2-ton.

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Locomotive Crane and Dragline

Mounted on a 100,000 capacity M. C. B. all steel standard gauge car, with 85 HP. locomotive type boiler and 12" x 14" double cylinder engines, 8" x 9" swinging engine, two all steel booms 55 and 80 ft. respectively, "A" frame of steam shovel type, jack arms have a spread of 36 ft. Will lift 68,000 lbs. on 80 ft. boom when swung at right angles. Has a 2 yd. Page bucket. Will pass any inspection as it is practically new. Immediate shipment. Chicago delivery.

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LEONARD F. SMITH
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100-Ton MORGAN STRIPPER CRANE

which has been replaced by duplex strippers, account of plant extension

Bridge span 80' 2"
Trolley span 8' 0"

complete with motors and controllers.

Can be seen by appointment.

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10 ton, 4 wheel, standard gauge INDUSTRIAL with 38' boom. Excellent condition. Located in Maine. Ready for shipment.

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"Used" but "Not abused" Machinery

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10 to 30 Tons Capacity

One 1¾ yd. McMyler Clam Shell Bucket. Located Jersey City.

One 25' Steam Shovel Boom with 18' dipper arm and 1 yd. dipper. Located Jersey City.

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Hayward Bucket

Two yard clam shell Hayward Bucket; has had very little service; can ship at once. Price $700.00.

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230 Milk Street Boston, Mass.

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1 NEW ¾-ton Box Hoist with 1 yd. Clam Shell Bucket.
1 NEW 36" 10,000 lbs. x 10 lbs. Kron Crane Scale with tare beam.
1 New No. 3 Burke Milling Machine—Bench Type.
3 Second-hand Newton Automatic Saw Grinders.

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5-TON 3-motor Alliance Machine Company Monorail Grab Bucket Hoist with one yard bucket 34'-0" lift, 230 volts direct current. Enclosed operating cab for outside exposure.

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Complete plants installed for handling or unloading Coal, Sand, Gravel, etc.

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Contractors' Equipment
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Concrete Mixer

Manufactured by Municipal Engineering & Contracting Company of Chicago, capacity 11 cubic feet, mixed concrete, 24 yards per hour; requires 7½ H.P. for driving. Machine in excellent condition.

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2—10-ton Buffalo-Pitts Macadam Road Rollers
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1—Road Scraper
1—6½ by 7 Boiler

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BELOW YOU WILL FIND SOME OF THE TANKS IN STOCK WHICH WE OFFER SUBJECT TO PRIOR SALE.

20— 4,200 gals., 8′ 8″ dia. x 9′ 6″ high.
6—10,000 gals., 7′ dia. x 35′ long.
4—12,000 gals., 10′ dia. x 20′ long.
6—15,000 gals., 10′ dia. x 25′ long.

CAN ALSO OFFER 5000, 10,000, 15,000, 50,000 and 100,000 GALLON TANKS FOR EARLY DELIVERY.

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Tanks for Liquids

12 tanks 10′ high, 8′ dia., 3534 gal., $456 ea.
3 tanks 9′ high, 9½′ dia., 4743 gal., $841.50 ea.
2 tanks 10′ high, 8′ dia., 3596 gal., $290 ea.
2 tanks 10½′ high, 10′ 6″ dia., 6758 gal., $545 ea.
2 tanks 10½′ high, 10′ dia., 6634 gal., $535 ea.
6 tanks 10½′ high, 10′ dia., 6634 gal., $535 ea.
2 tanks 10½′ high, 9′ dia., 5363 gal., $432.50 ea.
1 tank 10′ high, 9′ dia., 5363 gal., $432.50
1 tank 12′ high, 10½′ dia., 7726 gal., $984
1 tank 7½′ high, 10½′ dia., 4991 gal., $644
2 tanks 8′ high, 7′ dia., 2015 gal., $325 ea.
2 tanks 8′ high, 8′ dia., 2790 gal., $450 ea.

Chas. S. Jacobowitz
1382 Niagara Street, Buffalo, N. Y.

TANKS

Dia.	Hght.	Type	Gauge Steel No.	Cap.
7′	0″x 7′ 5″	Vertical	8	2100
7′	8″x 8′ 0″	Vertical	8	2730
8′	8″x 9′ 6″	Vertical	8	4200
9′	11″x11′ 0″	Vertical	8	6300
7′	8″x20′ 0″	Horizontal	8	7100
8′	8″x19′ 0″	Horizontal	8	8500

Built for storage. In Stock.

NATIONAL PRODUCTS COMPANY
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TANKS

PROMPT SHIPMENT

W. H. KELSEY CO.
1019 Citizens Bldg. Cleveland, Ohio

Pressure Tanks

2—10′ diameter by 24′ long, ¼″ thick
1— 6′ diameter by 24′ long, 9/16″ thick
4— 6′ diameter by 24′ long, 5/16″ thick

Condition practically new. All for immediate delivery f.o.b. cars New London, Conn.

MARVIN BRIGGS, INC.,
167 Sixth St., Brooklyn, N. Y.

---

1 BLAKE & JOHNSON roll thread machine, 1″ capacity. Good as new.

W. AMES & CO.,
Jersey City, N. J.

Tanks

Horizontal Storage Tanks, Capacities 9000 to 21,000 gallons, our specialty. Prompt shipment, in some cases immediate.

Sharpsville Boilers Works Co.
Sharpsville, Pa.

STEEL TANKS

1—54″ diam. x 19′0″.
1—36″ diam. x 30′0″.
1—36″ diam. x 28′6″.
1—60″ diam. x 30′0″.

HENRY POTTS & COMPANY
650 Real Estate Trust Bldg., Phila.

Prompt Shipment

Storage Tanks
of
Various Capacities

SHIPPERS' CAR LINE
165 BROADWAY, NEW YORK
Tel. Cort. 4942

BAND wheel, 22 ft. diameter, 46″ face, 15″ bore, weight 55,000 pounds.

WICKES BROS.
SAGINAW, MICH

FOUNDRY EQUIPMENT
BLOWERS

ROOTS-CONNERSVILLE, Sturtevant, etc., Positive Pressure, Exhausters, Fans, Volume Blowers, many sizes.
CUPOLAS, Shell diameters, 40″, 51″, 56″, 63″, 67″, 84″.
MOLDING MACHINES, Tabor make. 5 hand and power rockover, deep lift and fully equipped, etc.
AIR COMPRESSORS, 8″ x 8″ Chicago Pneumatic Tool Co., 9″ x 8″ Blaisdell.
STEEL BUILDINGS for Foundry. 60′ x 90′ with 40′ frame leanto, two crane runways, three hand power cranes, cupola bay, inspection Cincinnati.
ELECTRIC HOIST, 6 ton Sprague, 220 volt D.C.
CHAIN BLOCK, 5 ton Yale & Towne.

Gen ra' Machinery Dealers
THE CLIFTON-PRATT CO.
CINCINNATI, OHIO

A WILCOX Water Weigher, complete with storage tank. Capacity of 45,000 lbs. per hour. Used only three months.

NIAGARA ALKALI CO.,
Niagara Falls, N. Y.
J. N. J.

Big Bargain Coal Storage Plant

We have for sale, and immediate delivery, the Coal Storage Plant formerly owned by the Susquehanna Coal Co., located at Old Bridge Storage Yard, about six miles from South Amboy, N. J.

This Plant consists of seven complete units, each unit consisting of two trimmers and one reloader.

Each trimmer has a storage capacity of 15,000 tons of coal, with an overload of 25%, therefore each *unit* has a storage capacity of 30,000 tons, plus an overload of 25%. Each trimmer will unload 200 tons per hour—and material can be reloaded at same rate at a cost of about 2½c per ton each way. This Plant can be operated as a whole, or in individual units. It was designed, built and erected by the Link-Belt Engineering Co. of Philadelphia. It is in perfect condition, and can be readily taken down and reconstructed.

We are prepared to furnish blueprints and photographs upon request.

If you are interested, communicate with us at once, and we will arrange for inspection.

STERLING IRON & STEEL CO.

10th and Hamilton Streets PHILADELPHIA

Green Fuel Economizer
256 Tubes, 32 Sections. Each Section containing eight 9 ft. Tubes. In good condition, available for immediate shipment, price reasonable.

Stephen Sanford Sons
INCORPORATED
96 Church St. Amsterdam, N. Y.

50-50 LEATHER BELT REBUILDING PROPOSITION

Under our proposition we will rebuild your old leather belting into rolls of usable sizes

WITHOUT MONEY COST TO YOU

We return to you 50 per cent of the weight of the leather shipped us in rebuilt belting.

OF SPECIAL INTEREST TO LARGE USERS OF LEATHER BELTING

Write for Full Particulars

Teuscher & Son Machinery Supply Co.
527 N. 2nd Street St. Louis, Mo.

Elevator Belting

130'-26" x 10-ply Special Rubber Elevator Belting. New, never used. Highest grade. Will sacrifice.

ADDRESS BOX D-396
care *The Iron Age*, New York

CRUSHER

One (1) No. 6 Kennedy Gyratory Crusher, capacity 50 to 80 tons per hour passing through 2½" ring, size of combined openings 12½" x 90".

Address: TENNESSEE COPPER CO.
61 Broadway, N. Y. C.

ONE large Monarch Crusher and Cinder Mill No. 3 perfectly new, at a bargain.

P. O. BOX 643,
Waterbury, Conn.

We Have an Enormous Stock of Used and New

Power Transmission Machinery

And a Special Large Stock of
All Kinds of Belting

Send for Complete Stock List
TEUSCHER & SON MACHINERY SUPPLY CO.
527 N. 2nd St. St. Louis, Mo.

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250 H P. Rope Drive
Wound System

Good Condition. Full particulars given on application.

The National Lock Washer Co.
Riverside Works, Riverside, N. J.

BELTING

Large stock of new and second-hand—single and double—attractive prices.

L. F. SEYFERT'S SONS, INC.
437 N. 3d St. Philadelphia

One Mesta Machine Company Standard Low Type

4-Arm Sheet pickling machine 5 feet 3 inches stroke with acid proof dipping crates 10 feet 8 inches by 37 inches. Also several 22' x 4' 5" wide x 5' deep wood pickling tanks.
Above have been used only a reasonably short time and in excellent condition.

DETROIT PRESSED STEEL CO.
Detroit, Mich.

ONE new 53"x85' Stack with boiler plate base, plates ¼" thick, bent and punched but never erected. Shipment can be made immediately.

SIMONDS MANUFACTURING CO.,
Lockport, N. Y.

SMOKE STACK

Smoke stack 42" diameter by 83' long; three sections, flanged joints, two guy bands, guys and base plate, practically new. $1,000.00 on cars.

M. P. COLEMAN
230 Milk Street Boston, Mass.

2—42"x60" cylindrical blueprint machines, in perfect condition.
300 dozen plug taps 6-40.
300 lbs. high speed steel scrap.
100 New Departure Ball Thrust Bearings No. 206 and 8 New Departure Ball Thrust Bearings No. 1203.

American Machine & Foundry Co.,
5520 Second Avenue, Brooklyn, N. Y.

ONE 50-ton Vilter Refrigerating plant.

One Skeleton Steel Building 75 by 150 ft., about 40 ft. high to the roof trusses.

For full particulars and price apply to

M. J. HUNT
1316 Beach Street, Philadelphia, Pa.

PURE SILICA BRICKS

Owing to the impossibility of obtaining freight for France a French steel works offer for sale 60,000 Pure Silica Bricks, usual shapes, for Siemens Martin Converters,

READY FOR IMMEDIATE DELIVERY

and now at the HARBISON WALKER REFRACTORIES CO., Pittsburgh, Pa., U. S. A.

For full particulars, apply to

SOCIETE DES ACIERIES DE FRANCE

6 rue d'Antin, PARIS (France)

Conveyor Chain

GOOD AS NEW

2100 feet Forged Steel—6" "Maximum" Chain—300 foot lengths.

3600 ft.—Dodge Chain, bar 7/8" diameter, 8 1/4" pitch. Made of forged steel—250 ft. lengths.

Sterling Iron & Steel Co.
10th & Hamilton Sts. Philadelphia

Seven Strand Steel Cable

5,400 Ft. 3/16"
21,300 Ft. 1/4"
12,000 Ft. 9/32"
53,600 Ft. 5/16"
26,000 Ft. 11/32"
100 Ft. 7/16"
100 Ft. 1/2"
3,800 Ft. 1/4"
(Rubber Covered)

1-97A-60" Toledo Double Crank Press.

The B. F. Goodrich Company
Dept. 37, Akron, Ohio.

Second-Hand Cable

5000 feet one inch Steel Cable.

8500 feet of 3/4" Galvanized Cable.

Sterling Iron & Steel Co.
10th & Hamilton Sts. Philadelphia

ABOUT 2 Tons 1/4" x 3/32" Flat Galvanized Wire, soft temper.

HEWITT RUBBER CO.
240 Kensington Ave. Buffalo, N.Y.

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10 TONS 1/4" x 1/32" Flat Galvanized Steel Wire medium soft temper.

Address
HEWITT RUBBER COMPANY
240 Kensington Ave., Buffalo, N. Y.

NEW WIRE ROPE

New York City Stock

1864 ft. 3/4" 6 x 7 Galv. Cruc. Steel.

1868 ft. 3/4" 6 x 7 Galv. Cruc. Steel.

FAILOR-MARTIN CORPORATION
Woolworth Building, N. Y. C.

IMMEDIATE SHIPMENT

From Our

Chicago — Cleveland Warehouses

WIRE ROPE, PLOW AND CRUCIBLE

Tank Plate
Plain and Galvanized Corrugated Sheets
Blue Annealed Open Hearth Plates
Malleables and Steel Castings
Steel Tubing and Wrought Iron Pipe

ARMSTRONG & CO.
Peoples Gas Building CHICAGO

WIRE ROPE

New and Used

Immediate Shipment

On Several Diameters and Lengths

Atlantic Equipment Co., Singer Building, New York

Wire Rope

IMMEDIATE SHIPMENT

Send us your requirements and we will quote prices. Good stock standard sizes and grades going fast.

B. L. BEVINGTON MACHINERY CO.
547 W. Washington Blvd., Chicago, Ill.

NEW HIGH SPEED DRILLS

Cleve. Twist Drill Co. (Maker)

STR. SHANK-LONG SET—No. 415-R. H.

Quan.	Length.	Size.
612	6 1/2	11/32
25	9 1/4	43/64
94	7 3/4	31/64
24	3 5/8	1/16
7	5 7/8	13/64
222	7 1/4	7/16

TAPER SHANK—No. 403—R.H.

68	7 3/4	31/64
327	6 1/2	"N"
22	16	1 3/4

STR. SHANK—R.H.

12	1 9/16	60
440	4 5/8	"P"
12	3 3/16	9/64
210	4 1/4	"N"
168	3 5/8	No. 10
318	3 9/16	No .11
108	2 5/16	No. 42

STR. SHANK—L.H.

6	3 1/16	23
60	4 5/8	"P"
12	5	3/8

STR. SHANK—3-FLUTE.—NO. 409—R.H.

24	8 1/2	59/64
132	11 3/4	1 3/64
18	9 1/4	11/16

TAPER SHANK (DOUBLE TANG)—R.H.

6	9 1/4	43/64
13	9 1/4	11/16
2	9 7/8	49/64
4	10	51/64
6	10 1/2	55/64
14	10 1/2	3/4
11	10 7/8	31/32
12	11 3/4	1 1/4
4	12	1 3/16

STR. SHANK, OIL TUBE—No. 429—R.H.

11	9 in.	7/16
8	9	39/64
42	9	23/32
9	9	47/64
26	9	53/64
51	9	55/64
12	9	15/16
5	9	1 13/64
6	9	1 9/32
4	9	1 19/64
115	10	1 15/64
2	12	3/8
1	12	1 51/64
7	12	27/32
3	12	1 11/64
18	12	1 17/64
7	12	1 23/64
5	12	1 27/64
6	12	1 31/64
12	12	2 1/16

ST. SHANK, OIL TUBE—No. 429—L.H.

11	9	23/32

National Twist Drill Co. (Maker)

STR. SHANK—R. H.

60	3 3/16	9/64
54	3 1/2	11/64

Winter Brothers Co. (Maker)

STR. TAPPER TAPS—4-FLUTE

24	11 in.	1/4 x20 A.S.M.E.
65	11 in.	1/4 x20 U.S.S.

STR. TAPPER TAPS—3-FLUTE

108	11 in.	1/4 x20 U.S.S.
3	9 in.	1/4 x20 U.S.S.

Clark Equipment Co. (Maker)

STR. SHANK CELFOR DRILLS—TYPE K—SIZE 1 25/64

6	15 in. overall	11 1/8
18	13 in. overall	9 1/2
2	14 1/2 in. overall	11
1	16 in. overall	12 7/8
1	12 1/4 in. overall	10

Cleve. Twist Drill Co. (Maker)

STR. SHANK—10 IN. FLUTE

11	12 in. overall	1 25/64

NEW CARBON DRILLS

Whitman & Barnes (Maker)

12	3 3/4	No. 16

Cleve. Twist Drill Co. (Maker)

TAPER SHANK—MILLIMETER

203	7 in.	9.7

COLD ROLLED STEEL

41,490 lbs. 1 5/8 in. Rd. 15/25 Carbon
Made by Columbia Steel & Shafting Co.
75,000 lbs. 3/8 in. Hex. Screw Stock
Made by Union Drawn Steel Co.
28,361 lbs. 1 11/16" Rd. Screw Stock
Made by Columbia Steel & Shafting Co.

Spicer Mfg. Corp.

South Plainfield N. J.

BRIDGES AND GIRDERS

Immediate Delivery. Subject to prior sale.

GIRDERS

	LG	442	A	2 angles 6x6x⅞ top chord. 2 angles 6x6x⅞ bott. chord. 1 pl. 47¾x⅝. 1 pl. 47¾x⅝.		43′	1⅝″
1	LG	442	B	2 angles 6x6x⅞ top chord. 2 angles 6x6x⅞ bott. chord. 1 pl. 47¾x⅝ web.		44′	6¾″
1	LG	442	C	2 angles 6x6x⅝ top chord	LG 442 C	46′	1¼″
1	LG	442	D	2 angles 6x6x⅝ bott. chord. 1 pl. 47¾x⅝ web.	LG 442 d	47′	6¾″
				1 pl. 53¼x⅝ web.			
1	LG	441	A	2 angles 6x6x⅞ top chord	LG 441 A	38′	5″
1	LG	441	B	2 angles 6x6x⅞ bott. chord	LG 441 B	41′	9 1/16″
				One end skew, one end square of these two girders.			
				53¼x⅝″ web, 1 pl.			
1	LG	441	C	2 angles 6x6x⅞ top chord	LG 441 C	47′	2 1/16″
1	LG	441	D	2 angles 6x6x⅞ bott. chord	LG 441 D	50′	7¼″
				One end skew, one end square of these two girders.			
1	LG	440	A	2 angles 6x6x⅞ top chord	LG 440 A	46′	4 1/16″
1	LG	440	B	2 angles 6x6x⅞ bott. chord	LG 440 B	46′	4 1/16″
				1 pl. 53¼x⅝ web.			
1	LG	440	C	2 angles 6x6x⅞ top chord.			
1	LG	440	D	2 angles 6x6x⅞ bott. chord. 1 pl. 53¼x⅝ web.		47′	1⅜″
1	LG	439	A	4 chord angles 6x6x⅝.			
1	LG	439	B	1 pl. 53¼x⅜ web.		48′	10 1/16″
1	LG	439	C	4 chord angles 6x6x⅝.			
1	LG	439	D	1 pl. 53¼x⅜ web.		48′	10¼″
1	LG	449	E	4 chord angles 6x6x⅞ 47¾x⅜ web.		40′	4″
1	LG	450	A			48′	5″
1	LG	450	B			48′	5″
1	LG	450	C	4 chord angles 6x6x⅞		48′	5″
1	LG	450	D	1 pl. 53¾x⅜ web.		48′	5″
1	LG	450	E			48′	5″
1	LG	450	F			47′	9¼″
1	TG	451		4 chord angles 6x6x¾.		46′	8″
1	TG	450		1 pl. 62¾x⅛″ web.		46′	8″
1	TG	441		4 cover plates 14x¾.		53′	11⅜″
1	TG	440				53′	11⅜″

GIRDERS

1	TG	449			24′ 7″
1	TG	448			23′ 2″
1	TG	442	4 chord angles 6x4x¾.		24′ 10¼″
1	TG	446	1 pl. 30x½ web.		22′ 7″
1	TG	445			21′ 2″
1	TG	444			21′ 2″
1	TG	447	4 chord angles 6x6x¾.		31′ 2″
1	TG	443	1 pl. 41¾x½ web. 4 cover plates 14x¾.		41′ 2″

1—Girder, 48″x60′.
Chord angles 6x6x⅝″.
Web plate ½″x46″.
2 cover plates ⅝″x14″.
20 Stiffener Angles 4x6x⅜.

2—Single Track deck girder bridges, 3 spans each. Main span about 60 ft. Two side approach spans about 23 ft.

1—Double Track Through Plate Girder Span, about 65′8″ c. to c. skew.

2—69 ft. Double Track Skew Through Girder Spans, making a continuous bridge 140 ft. long. Long. Girders 8′x69′. Capacity live load train, 100,000 pounds capacity cars per track.

1—Plate Girder, 46′ 0¼″ long, skew ends.
Web, 36x⅜.
Chord angles, 6x6x⅞.
Cover plate, top and bottom, 14x 1/16-32′0″.

1—Plate Girder, 46′1¼″ long, skew ends.
Web, 36x⅜.
Chord angles, 6x6x⅞.
Cover plate, top and bottom, 14x 1/16x32′0″.

1—Plate Girder, 47′ 7⅛″ long, skew ends.
Web, 36x⅜.
Chord angles, 6x6x⅝.
Cover plates, 14x ⅞x38′, top and bottom.
Cover plates, 14x ⅞x32′, top and bottom.
Cover plates, 14x 1/16x22′, top and bottom.

1—Plate Girder, 48′ 3 13/16″ long, skew ends.
Web, 36x⅜.
Chord angles, 6x6x⅝.
Cover plates, 14x ⅞x38′, top and bottom.
Cover plates, 14x ⅞x32′, top and bottom.
Cover plates, 14x 1/16x22′, top and bottom.

FURTHER DETAILS UPON APPLICATION

LUCSAM STRUCTURAL CO., INC.

38 Park Row, New York City

Tel. Cort. 4373

Structural Steel

4000 ft. 12″ x ⅛″ flat steel.
1500 pieces 18″ x 9″ x ¼″ flat steel.
1050 pieces 18″ x 8″ x ¼″ flat steel.
4000 ft. 6½″ x 3/16″ flat steel.
5600 ft. 4″ x ⅜″ flat steel.
5600 ft. 4″ x ⅜″ flat steel.
1820 ft. 14″ x ⅛″ flat steel.
30,000 ft. 2¼″ x 5/16″ flat steel.
1400 ft. 26″ x ¼″ flat steel.
5600 ft. 2½″ x ¼″ flat steel.
2100 ft. 24″ x ¼″ flat steel.

Sterling Iron & Steel Co.
10th and Hamilton Sts.
Philadelphia, Pa.

We offer for

Immediate Delivery

30-20″ ROYERSFORD

Double Back Geared Upright

POWER DRILLS

Lucey Manufacturing Corporation
Woolworth Bldg., N. Y.

2750 doz. No. 48 Carbon Drills
List $1.65 doz., less 50%.

225 doz. No. 51 Carbon Drills
List $1.60 doz., less 50%.

"Cleveland make."

Immediate shipment from stock on any quantity at above price.

PEERLESS MILL SUPPLY CO.
Buffalo, N. Y.

I BEAMS

20″, 15″ 12″ and Smaller—Prompt Shipment.
200 TONS ROUND STEEL BARS
1″ and (1 1/16″) diameters 18 feet long
Prompt Deliveries Inquiries Solicited

2nd HAND PIPE, TUBES
Threaded and Coupled, Cut to Sketch

TANKS and BOILERS
For Storage, Pressure, Steam

RAILS
Re-layers and Cut to Length for Contractors' Use

The Perry Buxton Doane Co.
Boston, Mass.

I BEAMS

24″, 20″, 18″ and smaller.
Prompt shipment from stock.
3½c. per lb. f.o.b. N. Y. C.

STERLING IRON & STEEL CO.,
948 Courtlandt Ave., New York City.

"LIBERTY" CLINCH RINGS

SPECIAL DESIGN — Made from special material **Guaranteed Unbreakable.** All sizes. Plain and Galvanized.

LIBERTY STEEL PRODUCTS COMPANY, INCORPORATED
Woolworth Building New York
Telephones—5054-5056 Barclay

STEEL ROUNDS

200 tons ⅝″ second hand Rounds. Slightly bent. In first class condition. Write for full information.

SEFFREN IRON & MACHINERY CO.
HALSTED & LAKE STS. CHICAGO, ILL.

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49 Turnbuckle Rods

FOR SALE

2 inch diameter x 28 feet long with turnbuckle in the middle and nuts on both ends.

F. R. Long—W. G. Broadhurst Co.
Hackensack, N. J.

Manufacturers of

Bar Iron and Steel, Angles, Plates, Rails and Shapes. Quick delivery if necessary.

We are always in the market to buy or sell Rails of all kinds.

HIRSCH ROLLING MILL CO.
St. Louis, Mo.

4751 pounds Soft C.R. Steel, .065" thick, 8 5/8" wide.
13245 pounds Soft C.R. Steel, 5/32" thick, 8 1/8" wide.
5138 pounds Hard C.R. Steel, 1/8" thick, 8 1/16" wide.
7200 pounds Hard C.R. Steel, 1/8" thick, 8 1/4" wide.
44245 pounds Soft C.R. Steel, .050" thick, 7 3/4" wide.
39706 pounds H.R. Steel, pickled, limed and annealed, .049" thick, 7" wide.
8155 pounds Soft C.R. Steel, .050" thick, 9" wide.
5543 pounds Soft H.R. Steel, .065" thick, 3 1/4" wide.
71512 pounds Soft C.R. Steel, .050" thick, 9 1/2" wide.
9690 pounds H.R. Steel, .065" thick, 3 5/8" wide.
26815 pounds Soft C.R. Steel, .050" thick, 9" wide.
36785 pounds Soft C.R. Steel, .050" thick, 9" wide.

All the above steel is in straight strips 8 feet and longer.

The Bettcher Mfg. Company
Cleveland, Ohio

Prompt Shipment

1500 Tons O. H. Tank and Flange Quality Plates No. 8 Gauge to 1" thick, up to 96" wide and 294" long.

Also: Flat Bars sheared from Plates, all widths from 1 1/2" up and all thicknesses.

Wire us your Requirements.

SHIPPERS' CAR LINE

165 Broadway, New York, N. Y.
Telephone 4942 Cortlandt

PLATES

LARGE STOCK
NEW MATERIAL
O. H. STEEL
SHEARED PLATE
1/4", 5/16", 3/8", 1/2", 5/8", 11/16", 9/16", 3/4", 7/8", 1", 1 1/8", 1 1/4", 1 1/2".
MOST PLATE OVER 60" WIDE AND OVER 15' LONG.
ALSO LIGHT RAILS, 25 lb., 30 lb., 40 lb.
CONCRETE REINFORCING
BETHLEHEM BEAMS, FLAT BARS, ETC.
MATERIAL SOLD PLAIN OR FABRICATED.
SEND FOR LISTS.

The Republic Structural Iron Works Co.
1100 E. 53rd St. Cleveland, O.

WE OWN

AND HAVE IN OUR

WAREHOUSE

IN

NEW YORK CITY

115 tons of Special Steel, similar to moulding, 10 to 16 ft. lengths, in the original boxes.

Same could be used for reinforced work. Price 3c per lb., f.o.b. cars New York.

ALSO

150 tons of annealed and cleaned, lime coated, No. 445 open hearth Rivet Wire in coils of approximately 250 lbs. each, cars, New York.

and

50 tons Cold Rolled Strip Steel, 6 and 8 ft. lengths. Lists and prices upon application.

All of this material can be inspected and is offered, subject to prior sale.

Midgley & Prentice, Inc.
30 Church St., New York City

SPRING Steel tempered 1/2" x .047 at attractive price.

THE JACOBS BROS. CO., INC.,
223 Wallabout Street, Brooklyn, N. Y.

Steel Bar Seconds

FOR SALE—Basic open hearth steel, 1 1/8" square with rounded corners. Suitable for stirring rods, pricker bars, spreader bars, reinforcing rods, braces, etc. For full information, price, etc., address

N. & G. Taylor Co.
300 Chestnut Street Philadelphia

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Letters from advertisers like the following are convincing proof of how closely the sales column of this medium are scanned each week:

"WE are very much satisfied with the results received from this advertisement. We have gotten inquires from all over the United States."

In other words, when you list your salable goods in these columns you can count upon the attention of important buyers practically everywhere. It is not difficult, in view of this, to understand why sales are easily made—not only easily, but consistently.

The Clearing House Section

The Iron Age
239 West Thirty-ninth Street
New York City

---

250 tons of hammered iron and cold rolled steel shafting, from 2" up to 12" diameter.
20,000 ft. 1½ inch pipe,
30,000 ft. 2 inch pipe,
10,000 fh. 3½ inch pipe,
2,000 ft. 8 inch pipe,
30,000 ft. 4 inch tubing.
Boiler tubes, practically new.
3,000 3-inch boiler tubes, 16 feet long,
2,000 3½-inch boiler tubes, 16 to 18 feet long,
3,000 4-inch boiler tubes, 16 to 18 feet long.
25 Electric Motors and Generators.
2 Wannenwetsch Rendering Tanks, 5' diameter, 10' high, with or without vacuum pump, price $1500.00 each.
2 10-ton Ice Machines.
Pumps.
1 Snow Steam Pump, 12 x 18 x 9½ x 18, $750.00
1 Gould & Eberhardt belt-driven triplex plunger pump, 4" suction, 4" discharge, $350.00
1 Snow Duplex Pump, 7½ x 4½ x 10, $100.00
2 Snow Duplex Pumps, 6 x 4 x 6, $50.00 each
2 Buffalo Duplex Pumps, 6 x 4 x 6, $50.00 each
2 Snow Duplex Pumps, 5¼ x 3½ x 5, $50.00 each
1 Snow Duplex Pump, 4½ x 3¾ x 4, $40.00
1 Cameron Steam Pump, size 3-A.

JACOB ULLMAN
Oneida and Lord Streets, Buffalo, N. Y.

---

75 tons 18 gauge second hand corrugated galvanized sheet iron. Size of sheets is approximately 2½'x10', weighing approximately 235 lbs. to the square, price 3c. per pound f. o. b. cars Chicago. This is exceptionally fine material.

American House Wrecking Company
3800 Milwaukee Avenue
Chicago, Ill.

CAN supply 128 lb. tinplate scrap to cut 1⅝" circles and 3¼" round or square blanks.

PRECISION METAL WORKERS
1443 Carroll Ave., Chicago, Ill.

Anvils — Anvils — Anvils

About five hundred—mostly new—some slightly used—attractive prices.

L. F. SEYFERT'S SONS, INC.
437 N. 3d St. Philadelphia

Shafting

6 pieces 10 in. steel shafting with C.I. Gear hub on one end—16′ 10″ long.
7 pieces 10″ steel shafting with steel swedge couplings on one end—12′ 8¼″ long.
3 pieces 10″ steel shafting 17′ 1″ long.
3 pieces 10″ wrought iron shafting 17′ 1″ long.
36 pieces 10″ hammered iron shafting with swedge couplings both ends—21′ long.

ADDRESS BOX F-668
care *The Iron Age*, New York

STEEL PIPE BRITISH THREAD

400,000 Ft. Sizes 1″ to 4″. Now in Warehouses New York and Pittsburgh

WIRE NAILS

5,000 Kegs Now in Warehouse New York

MORRIS DIXON
22 WHITEHALL ST. NEW YORK

Used Material Cheap

24″ I-Beams, 14′	63—H-Beams, 6″ x 15′
20″ I-Beams, 12 to 21′	1000—Bars, 1¼″ Tire
18″ I-Beams, 10 to 13′	Channel, 11 and 12′
15″ I-Beams, 8 to 16′	50—Bars, 1½″ Rd.,
15″ Channels, 10 to 18′	12 to 15′
	250—Bars, 1⅝″ Rd.,9′

Make Us an Offer

We carry a large stock of used material. Send us your requirements.

H. LEY & CO. IRON WORKS
Lincoln Avenue and C. L. & N. R.R., Cincinnati, Ohio

I HAVE 2000 lbs. of steel which I can offer for sale. It is a manufactured article, 10″ long, ¾″ wide.

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WE offer for immediate shipment a quantity of Open Hearth Nut Steel, suitable for making hot pressed nuts, size 23-32x⅜ by 20 ft. lengths and ends. This is good material, will be sold as a whole or in car load lots.

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6 Inch Steel Discs

We offer 15 to 20 tons of No. 20 and 24 ga. 1 pass Cold Rolled Steel Discs, 6 to 6⅛ inches in diameter for immediate shipment.

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We buy and sell all sizes of pipe, threaded and coupled to order.

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⅜″ to 3″ New Pipe Suitable for Railings and Structural Work of every character. Any quantity. Write for prices.

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New and Used

All sizes for immediate delivery.
Boiler Tubes,
Structural Steel,
Beams, Channels, Angles,
Built-up Steel Columns and Girders.
1—Bryant Universal Cold Metal Saw.
1—2″ Saunders Pipe Threading Machine.

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PIPE

All Sizes, Bargain Prices, Second Hand and New

IMMEDIATE DELIVERIES

8,000′ of 12″ pipe	50,000′ of 2″ pipe
10,000′ of 8″ pipe	50,000′ of 1½″ pipe
10,000′ of 6″ pipe	100,000′ of 1¼″ pipe
10,000′ of 4″ pipe	100,000′ of 1″ pipe
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Also a large stock of 16″, 18″ and 20″ pipe.

Pipe & Contractors Supply Co.
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WROUGHT IRON PIPE

Thoroughly overhauled, with new threads and couplings, guaranteed to give entire satisfaction. Pipe cut to sketch. It will pay to correspond with us.

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New, Second-hand and Mill Seconds

Boiler Tubes

Large Stock All Sizes

Inquiries Solicited

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11,000 ft. 24-in. Bell and Spigot. Used but good.

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ABOUT 500 ft. 111/16″ O.D. x .083 wall seamless brass tubing in mill lengths. Prime condition.

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Iron and Steel Scrap

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IN THE UNITED STATES IN THE
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ESTABLISHED 1847

THE MORTON B. SMITH CO.

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Locomotives

For light and heavy service, narrow and standard gauge Locomotives of all types; also Passenger and Freight Cars. Largest stock Locomotives in United States.

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100 Industrial Cars

24″ Gauge, 12″ Wheels, Roller Bearing, 1½″ Axle, Angle Frame ¼″ thick, 1½″ by 2¼″, 7′ long, 30″ wide over all.

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RAILS! CARS! WIRE!

MATERIAL AND EQUIPMENT
of the
ST. JOSEPH VALLEY RAILWAY COMPANY
and the
ST. JOSEPH VALLEY TRACTION COMPANY
Elkhart, Indiana

Purchased from the Receiver of the above named Companies, their entire Tracks, Rails, Machine Shop Tools, Implements, Wire, Cars, Rolling Stock and material of all kinds.

The St. Joseph Valley Railway Company extended from the town of La Grange, Indiana, to Columbia, Ohio, and the St. Joseph Valley Traction Company extended from the City of Elkhart, Indiana, to the town of La Grange, Indiana.

The material is in excellent condition and represents approxi mately the following:

75 Miles of 70 lb. Standard Steel Rails.

240,000 Ties.

1—Combination Passenger Car.
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3—Fairbanks-Morse Gasoline Cars.
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1—Box Caboose Car.
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2—Section Speeders.
Shop Machines.
Tools.
Implements.
Section Men's Tools, and a large quantity of miscellaneous apparatus.

Immediate delivery can be given on any part of this equipment. Inspection can be made from my office in the City of La Grange, Indiana.

Address all inquiries to

BENJAMIN HARRIS, Liquidator
LA GRANGE, INDIANA

Saddle Tank Locomotives

Two

Standard Gauge

Baldwin Type 0-4-2, one 33-ton, the other 35-ton, just refitted in locomotive shops, and ready for shipment. Inspected and approved by R. W. Hunt & Co.

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KOPPEL 2-way dump—36-in. gauge—4 yard dump cars; Locomotives, 36-in. gauge; Compressors; Engines; Generators; Pumps and other machinery.

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Three to four miles 24" gauge single track 30 lb. rail, with angle bars, three locomotives, five open passenger cars, two 4-wheel trucks, all in perfect condition and ready for prompt shipment.

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Weights 12 to 100 lb.

"Specials"

300 tons 100-lb., with angles. **New.**
125 tons 65-lb. A.S.C.E., with angles. **New.**
400 tons 60-lb. A.S.C.E., with angles. **New.**
1500 tons 56-lb., with angles. **Relay.**

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1—49½ ton 4' 8½" gage Vulcan 6-wheel switcher. Steam pressure 180-lb. **Good as new.**
1—30-ton 4' 8½" gage Davenport S. T. coal burner. Overhauled. **First class.**
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1—55 ft. 150,000 capacity 6-wheel trucks. **Excellent.**
15—36 ft. 60,000 capacity. **Thoroughly overhauled.**

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29—10-ton 24-in. gage. **Double Hopper. All metal. First Class.**

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1—280 ft. Norwalk simple steam, 2 stage air, 100 lb. air pressure. **Excellent.**
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1—½ yd. Hayward Clam Shell with teeth. **A-1.**
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1—35 k.w. Western Electric, 125 volts D.C. direct connected to Buckeye engine with switchboard. **Excellent.**

Generator or Motor

1—150 k.w. Wood G. E. 3 phase, 60 cycle, 480 volts, 180 amp., 900 r.p.m. Generator changed to synchronous motor, can be used either way. Complete with pulley, exciter, switchboard and instruments. **A-1.**

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2—Built up plate girders, 7 ft. 6 in. high, 80 ft. long; weight about 35,000 lb. each.
2—Built up plate girders, 6 ft. 4 in. high, 55 ft. long; weight about 13,000 lb. each.
8—24 in. x 80 lb. I Beams, 15 ft. 11 in. long.
4—24 in. x 80 lb. I Beams, 15 ft. 4 in. long.
4—Plate Girders 4 ft. high, 40 ft. long.
15—15 in. x 60 lb. I Beams, 20 ft. long.
35— 4 in. I Beams, 6 ft. 4 in. long.
15—12 in. channels, 12 ft. 6 in. long.
8—12 in. x 30 lb. I Beams, 20 ft. long.

First Class.

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Get Bulletin 237—78 Bargain pages.

1—3 ton G. E. Electric Locomotive, 350 volt, 28 inch gauge (gauge can be changed).
1—25 K.W. Motor generator, 250 volt, driven by 2200 V, 3 phase, 60 cycle, induction motor.
1—2 panel switchboard complete with instruments.
Further details on request.

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20—60,000-lb. capacity, 37 ft. x 9 ft. 4½ in.
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2—60,000-lb. capacity, 36 ft. x 9 ft. 6 in.
1—60,000-lb. capacity, 34 ft. x 9 ft. 4 in.

LOCOMOTIVES

2—18-in. x 24-in., 10 wheelers.

RAIL

5000 tons 70-lb., 2000 tons 60-lb.
All sections 25 lb. to 56 lb.

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50 Ton Standard Gauge Locomotive.

Completely Overhauled.
Immediate Shipment.
Send for Cut and Description.
Also
One 36" Porter, Good Condition.

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WE are in an excellent position to furnish Light Steel Rails and accessories in quantity shipments for both domestic and export markets.

Write for Quotations Today

Liberty Steel Products Co., Inc.
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For Shipment from Cleveland

NEW RAILS	RELAYING RAILS
12 lb.—100 tons	30 lb.—100 tons
16 lb.—125 tons	35 lb.—100 tons
20 lb.—130 tons	40 lb.—100 tons
25 lb.—175 tons	56 lb.—150 tons
30 lb.—180 tons	60 lb.—100 tons
40 lb.—140 tons	70 lb.—250 tons
RAILROAD TIES	75 lb.—300 tons
	80 lb.—900 tons
	85 lb.—725 tons

THE
FISHEL & MARKS CO.
CLEVELAND, O.
Pittsburg Detroit Chicago

One 50-Ton Pittsburgh Locomotive.
One Combination Freight and Passenger Coach.

RAILWAY SUPPLIES
Relay Rail, Track Spikes, Track Bolts, Frogs, Switches, Etc.
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Rails Rails Rails

For Relaying and Construction Purposes
16 lb., 20 lb., 25 lb., 30 lb., 35 lb., 40 lb., 50 lb., 56 lb. 60 lb., 70 lb., 80 lb., 100 lb.
ANGLE & SPLICE BARS—SPIKES, BOLTS, TIE PLATES, FROGS & SWITCHES

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RAILS

Immediate Shipment from Stock

1000 tons 90 lb. A.T. & S.F. section.
150 tons 90 lb. A.R.A. Type A.
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350 tons 100 lb. P.R.R. (Ill. Steel No. 10031).

All new, complete with full complement bars, bolts and nuts.

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UNITED STATES RAIL CO., CUMBERLAND MARYLAND

Manufacturers

Light Steel Rails

Prompt Delivery

8, 12, 16, 20, 25, 30, 35, 40 lbs. per yard

A. S. C. E. Sections, with Splices and Spikes. Frogs and Switches, Certificate of Inspection by Hildreth & Co., Inspecting Engineers of New York City, assuring absolutely first quality, furnished free of cost.

We Have Ready for Prompt Shipment

175 tons 56 lb. relayers and necessary splices.
500 tons 75 lb. relayers and necessary angle bars.
150 tons 80 lb. contractors' rails with necessary angle bars.

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No. 2 Rector Street New York

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ALL SECTIONS
LIGHT AND HEAVY
NEW AND RELAYING

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NEW RAILS

About 700 tons, first quality, 80 lb. ASCE Open Hearth, angle-joints complete and spikes. Immediate shipment.

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2 Rector St., New York, N. Y.

Relaying Rails

of all weights. Write us for prices
Track material and equipment.

H. M. Foster Company
Continental Building BALTIMORE, MD

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85 POUND

A. S. C. E. Relayers

16,000 tons—with Angle Bars to match.
Available immediate shipment and centrally located.
We positively own these Rails and offer same in carload lots and over.
25,000 tons—Relayers, sizes 25-lb. to 100-lb. in stock our Pittsburgh yards and vicinity.
Immediate shipment guaranteed and prices very attractive.
Carload and less carload inquiries and orders solicited.
Rails cut to length for structural purposes.
Frogs, Switches, Bolts, Nuts, Spikes and all accessories.

L. B. Foster Co.
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Rails

150 tons each new 85, 90 and 100 lb. rail.
100 tons each new 70 and 75 lb. rail.
500 tons each new 50, 56 and 60 lb. rail.
180 tons 20 lb. relayers with bars.
10 tons 25 lb. relayers with bars.
8,000 narrow gauge wood ties.

Also new frogs, switches, spikes and bolts.

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500 TONS new O. H. 105 lb. NYC standard rails with splices.

1000 tons new O. H. 90 lb. ASCE rails with splices.

Will quote on entire quantity or on such lots as required for prompt shipment.

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Book Bldg.
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Relaying Rails

56 MILES

3 M 35 lb.; 49 M 40 lb.; 4½ M 50 lb.

Joints to match with spikes.

Delivery Live Oak, Fla.

ARTHUR T. WILLIAMS
Williams Building, Jacksonville, Fla.

FOOT - BURT 5 spindle adjustable Rail Drill, No. 4 Morse Taper. Two N.H. Planers 32"x32"x8' and 18"x 18"x3'.
Two Power Presses Ferracute D. A. G. No. 4 and P-5.
J & L Turret Lathe 2"x24" Bar and Chuck Equipment with roller feed.

F. A. BENNETT
30 Church St., N. Y. C.

Relaying 30 lb. and 60 lb. Rails!

also 20 lb., 30 lb., 40 lb., 56 lb., 70 lb., 85 lb. and other weights; and New Rails, any weight. Low prices on new Frog and Switch Material. Second-hand Locomotives.

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419 Wood Street Pittsburgh, Pa.

RAILS

RELAYING
40, 56, 60, 70, 75, 80, 85 and 90-lb.
NEW STEEL
8, 12, 16, 20, 25, 30, 35, 40 and 45-lb.

These rails are in stock at our Pittsburgh yards, and can be shipped immediately; also second-hand rails in stock cut any length needed for building and contract work.

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Rail Dealers
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2 MILES 35 lb. relaying rails and bars. 8 miles 40 lb. relaying rails and bars, located Middle Georgia. Attractive prices before removal to stock. One 35 ton Pennsylvania type standard gauge 6 wheel locomotive. Six standard gauge 34" wheel logging cars. Large quantity 6" and 8" second-hand pipe.

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STEEL RAILS

84000 lineal feet 50 lbs. per yard
50000 lineal feet 60 lbs. per yard
With splice bars. Prompt shipment. Subject to inspection.

E. C. SHERWOOD
50 CHURCH STREET
NEW YORK

Relaying Rails

1,000 tons of first-class 100 lb. open hearth relaying rails with angle bars to match. Immediate shipment from New York City.
10,000 tons 56 to 90 lb. Rail, with bars to match, for Eastern delivery.
2,000 tons 56 to 65 lb. Rail, with bars, for delivery between Buffalo and Chicago.
2—10 ton Brown Hoist Locomotive Cranes, located at our Lebanon Yards. Immediate delivery. Bargain to quick buyer.

Send your inquiries to our nearest office.

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MAIN OFFICES:
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RAIL

Industrial Track
56 lb. Relayers
60 lb. Relayers
200 tons Grooved Rail

LEROY COVENTRY
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Several Sections Ready for Immediate Shipment

ATLANTIC EQUIPMENT CO.
Singer Bldg., New York

85-lb. Rails

attractive price, quick shipment. Also sections 12 to 100 lb.

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Large Lathes.
Plain and Universal Millers.
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Slotters.
Large Punch and Shears.

New or used if in good condition.

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NO. 0, No. 00 and No. 2 Full Automatic Screw Machines for important government contracts.

INTERNATIONAL ARMS & FUSE CO.
Bloomfield, New Jersey

3—36" TO 72" PLANERS.
4—36" TO 120" VERTICAL BORING MILLS.
3—HORIZONTAL BORING MILLS WITH BARS FROM 2¼" TO 5".
RADIAL DRILL PRESSES, 3' TO 6'.
48" CAR WHEEL BORING MILL.
LATHES FROM 36" TO 72".
LARGE PLAIN, UNIVERSAL AND VERTICAL MILLING MACHINES.
HEAVY SLOTTERS.
Send Full Particulars to
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JONES & LAMSON Turret Lathe, good condition, 2⅛" hole through spindle.

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Lead Machinery

Equipment required for a small plant for the manufacture of sheet lead and lead pipe.

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NEW or Second Hand Gate Shear. Minimum capacity seventy-two inch by five-eighths inch plate. Minimum depth twenty-four inches.

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9" or 10" 4 stand bar mill. Give full description, specifications and price.

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Thread Milling Machine

Lees-Bradner No. 8 or 12. Mail de-details. Condition. Point of inspection. Price.

ZEH & HAHNEMANN CO.
NEWARK, N. J.

NEW or Good second-hand Multiple Drill, 8 or more spindles, No. 12 "Natco" or other make of same capacity.

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Newton, Iowa

WANTED TO BUY

10 Board Drop Hammers.
1500 to 2000 lbs., Chambersburg or Bliss preferred. Immediate delivery.

Globe Malleable Iron & Steel Co.
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No. 19 and No. 20 Bliss Single Acting Power Presses

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Can You Furnish PROMPTLY

Castings, Forgings, Stampings, Machine Work, etc.?
Write us fully, stating quality, capacity, deliveries, etc.

ROBERT R. BUSHEY COMPANY
P. O. Box 874 Uhrichsville, Ohio

WANTED—for immediate delivery, one 50,000 lb. Riehle or Olsen Testing Machine.

ATLAS STEEL CASTING COMPANY,
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Pipe Machine

Capacity to thread 2½" to 8" pipe. Prefer Curtis or other revolving die machine. State price and condition.

Joseph E. Thropp, Everett, Pa.

A 5" to 12" Vertical Coupling Tapping Machine, complete.

South Chester Tube Company,
Chester Pa.

WE buy for cash—for dismantling or manufacturing purposes—plants of any size or description.

If you have anything for quick turnover write us at once.

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STEAM SKIP HOIST ENGINE

Good second hand Otis Furnace hoist, can use skip hoist engine or elevator hoist engine that can be altered to operate single skip. Cylinders 12" x 12" or larger. State shop number, condition and price.

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Second Hand

Babcock & Wilcox longitudinal drum, hand fired, sizes 105 H.P. to 135 H.P. Send price, complete description and where inspection can be made.

HOLSAM CO., INC.,
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Water Tube Boilers

Insurable for 150 lbs. or more pressure, in any sized units. Advise, giving location and best price for spot cash.

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Overhead Traveling Crane

Bridge or Trolley

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Give us all facts quickly.

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WANTED

Advertising Rates: 1" ONE TIME $4.00 3" ONE TIME $10.50
2" ONE TIME $7.00 4" ONE TIME $12.00
RATES FOR OTHER SPACES AND LONGER TERMS FURNISHED UPON REQUEST

STORAGE TANKS

6—10,000 gal. horiz. cylindrical.
4—12,000 gal. horiz. cylindrical.
3—2000 to 5000 bbl., open top.
Give us full details about dimensions, price, location and present condition.

ADDRESS BOX F-539
care *The Iron Age*, New York.

Storage Tanks
Pressure Tanks and
Tank Cars

National Products Company
East Liverpool, Ohio

A PRESSURE tank about 8 feet long x 2½ or 3 feet in diameter. Must stand 150 pounds air pressure.

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THE Ann Arbor Railroad Company is in the market for one 2-line, ¾-yard clam shell bucket. Address

N. C. FOSS, Purchasing Agent
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Track Scales

100-ton capacity standard gauge track scales, with steel frame. Must be modern and in first-class condition. State price and length of platform.

Joseph E. Thropp, Everett, Pa

SECOND hand elevating, electric (storage battery), truck. Elwell Parker, Buda or one of equal type.

CONNECTICUT ALLOYED METALS CO., INC.
Bridgeport, Conn.

TO correspond with party having a second-hand Power Annealing Charging Truck for sale.

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care *The Iron Age*, New York

USED
STEEL ROPE

Crucible—Plow—Improved Plow
All fit for long use, ½" to 1⅛"

A. B. CLARK CO.
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We Buy for Cash

Any Surplus Stock of

Bar Iron
Bar Steel
Structural Material
Plates, Sheets, Etc.
Good Second Hand Iron and Steel

Send itemized lists with full description and prices

AMIRON SUPPLY, Inc.
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STEEL Angles, second-hand, must be straight and fit for use in lattice bracing between girders and miscellaneous work on construction job. Prefer size 4"x4", thickness ¼" to ⅜". Can use small carload. State price f.o.b. Saxton, Pa., and size and length in answer.

Joseph E. Thropp

Everett Pa.

4,000 to 6,000 Feet of Second Hand Double Strength Wrought Iron or Steel Pipe
6 inch to 10 inch

UTAH FUEL COMPANY
P. O. Box 1386
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BALL Machine or Radius Slide for turning steel balls up to 5" or 6" in diameter.

S. BLICKMAN
199 Lafayette Street, New York City

Second Hand
CUPOLA
54" to 72" Shell

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Second Hand Foundry Equipment of all kinds.

Send full particulars.

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WE WANT
BRASS ASHES & SKIMMINGS
ALSO
ALUMINUM SCRAP OF ALL KINDS

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DETROIT MICHIGAN

A Go Getter

Is a term applied to General Pershing because he has the habit of going out and getting what he's after.

The expression can be used in another way, but with almost equal force, with reference to the Wanted Section of *The Iron Age*, because it is so successful in finding things. For example, here is a letter from a firm who just used it to get a special punch:

"In regard to the ad in the Wanted Section, would say that it resulted in our obtaining the equipment desired."

Give it a chance to go get what you want and then you needn't worry.

Wanted Section
The Iron Age
239 West 39th St., New York City

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FACTORY SITES AND FACTORIES FOR SALE—AGENCIES WANTED
—MISCELLANEOUS ADVERTISEMENTS

ADVERTISING RATES: 1" 1 TIME $4.00, 2" 1 TIME $7.00, 3" 1 TIME $10.50, 4" 1 TIME $12.00
RATES FOR OTHER SPACES AND LONGER TERMS FURNISHED UPON REQUEST

New Steel Buildings
for
Immediate Delivery

On account of revised plans we offer for sale the following steel buildings which are in our works but have never been erected:

1—Building 46' 8⅜" wide, 145' long, 69' 10" to bottom chord of truss—weight of steel 597,551 pounds. This building is especially designed for heat treating plant and is of very heavy construction. It has crane runways and can be sold with or without 30-ton Shaw crane having 5-ton auxiliary hoist, especially made with fast lowering speeds for vertical quenching. Weight of crane 104,000 pounds; voltage, 230 D.C.; total lift, 75 ft.

1—Building 21' 8⅛" wide, 220' long, 37' 3" to lower chord of truss—weight of steel 261,765 pounds. This building was designed for machine shop, drawing department and storage, and is three stories, complete with three stairways from each floor. Blueprints mailed on request.

Sizer Forge Co.
BUFFALO, N. Y.

Buildings Financed

Will furnish for responsible parties Plans, Specifications, Finance and Construct modern Concrete Factory or Warehouse buildings costing over $100,000. Surety Co. bond given. Write us.

ED. E. WALKER & CO.,
519 Madison Avenue,
Covington, Kentucky.

LARGE MANUFACTURING PLANT

MAHONING DISTRICT OF EASTERN OHIO

Consisting of Machine and Pattern Shop, Grey Iron Foundry, Woodworking Plant. An established concern, manufacturing steam and gas engines, woodworking and special machines. Now finishing contract building special boring lathes for Government. Physical valuation approximately $350,000.00.

Subsidiary Plant, owned by same stockholders, producing boilers and special plate work. Worth about $100,000.00. Could be sold with above plant, but not separately. Satisfactory terms. Possession immediately.

H. L. HOPWOOD
Industrial Lawyer,
First National Bank Bldg.,
Columbus, Ohio.

Building for Sale

Practically new, about 100 x 200 ft., containing about one hundred thousand feet very fine medium and heavy timber, and about 3000 ft. 3/16" corrugated iron sheets about 8 and 10 ft. long by 26" wide, on siding of Central Railroad at Farmingdale, N. J., about 55 miles from New York or Philadelphia. Has about 5000 gallon tank on roof and about 60 ft. smoke stack about 24" wide. All easy to dismantle, building formally used as fertilizer plant. Some parts six stories high. Price very low. For Quick sale.

Also two smaller buildings about 50 ft. by 20 ft. by 20 ft. high.

For Particulars

NATHAN KLEIN & CO.
208 Centre St. New York

Machine Shop and Foundry
FOR SALE

Immediate Possession. Fully manned with thoroughly experienced workmen now on jobs and tools for government work but not under contract.

EQUIPMENT INCLUDES:

4—Grinders.
1—Worcester Drill Grinder.
17—Lathes, 16" to 28".
1—21" Gisholt Lathe.
2—Screw Machines.
4—Shapers.
5—Millers.
1—36 x 36 x 10 ft. Pond Planer with four heads.
1—24 x 24 x 8 ft. Cincinnati Planer with one head.
1—No. 69 Detrick & Harvey Horizontal Boring, Drilling and Milling Machine.
1—42" Niles Vertical Boring Mill with two heads.
1—Fosdick & Holloway 4 ft. Radial Drill Press with sensitive attachment.
4—Lever Drill Presses.
2—4-Spindle Sensitive Drill Presses.

All equipment up to date and in perfect condition. Will be sold only as complete and going concern. Modern brick and steel construction with Sprinkler system.

73 miles from Syracuse on New York Central Railroad.

Investment required, about $200,000.

ADDRESS BOX F-585
care *The Iron Age*, New York

FOR SALE
Fifteen Acre Factory Site in Rochester, N. Y.
on three railroads,
TWO BUILDINGS

containing 64000 feet ground floor space. 24000 feet brick suitable for factory. 40000 feet of cement block, lined with hollow tile and interlined with cork, suitable for storage and convertible into factory space. New foundation for another building. Large brick stack. Double switch through the property, on New York Central, Buffalo, Rochester & Pittsburgh, and Pennsylvania R.R. Adjacent to the Barge Canal. This property might be divided.

Apply Owner,
60 Brown's Place, Rochester, N. Y.

Malleable Iron Industry Wanted

An admirable manufacturing location for malleable iron plant is offered at Poughkeepsie, New York. No industry of this character between Albany and New York City, giving advantage of extraordinary trade territory; Chamber of Commerce will assist such manufacturer; transportation is offered by New York Central and Central New England Railroads; water transportation by Hudson; electric power in unlimited quantities; labor supply guaranteed.

Write Chamber of Commerce for complete facts.

OUR plant, consisting of a machine, blacksmith and pattern shop with stock and tools, complete, is for sale.

We will sell outright or will retain half of selling price in stock, with or without personal service—in a responsible shipbuilding concern.

ADDRESS BOX F-527
care *The Iron Age*, New York

GRAY Iron Foundry and Machine Shop for Sale. Will sell separately or together. Both in operation on government work in connection with regular paying line of machinery manufacture. Fine location in central Indiana, on five railroads. Splendid shipping facilities from factory switch. City of 10,000 population. Foundry 5000 sq. feet of floor space. Machine shop 16,000 sq. feet. Operating with electric motors, current furnished by city.

ADDRESS BOX F-649
care *The Iron Age*, New York

"Always Obtain Satisfactory Results From Use of Your Medium"

This is a word of encouragement from an advertiser who, time and time again, has used the Business Opportunities Section to dispose of property and manufacturing plants of various kinds,—Mr. H. L. Hopwood, Industrial Lawyer, Columbus, Ohio.

The Business Opportunities Section is the kind of a medium you want to use to get results. Let us help you decide just how to go about it.

Section,
The Business Opportunities
The Iron Age,
239 West 39th Street
New York City

Machine Shop for Sale

An exceptionally well-equipped shop with modern machine tools, all recently purchased. Are the best standard makes, consisting of following tools:

7—Lathes from 12 to 20" swing
2—Brown & Sharpe Milling Machines
1—Small Screw Machine
2—Shapers
6—Drill Presses
1—Brown & Sharpe Surface Grinder
1—Cincinnati Universal Tool Room Grinder
1—Heel No. 60 Cylinder Grinder
1—Heel No. 200 Ring Grinder
2—Heavy Power Hack Saws
1—30" Barnes Arbor Press
2—Gas Furnaces
2—Complete Blacksmith Outfits
1—Bench Lathe

Complete set of tools for tool making
7000 square feet floor space.

At present have orders on hand for 6 months' profitable work. Some of this is for the Government. Now employ 35 skilled men, although there is capacity for 60 men.

Doing satisfactory work for important manufacturing concerns. Can refer to them as to general trade reputation.

Specialize in machine parts, jigs, fixtures, gauges, etc. Splendid opportunity to acquire a going concern.

Address Box F-573
care THE IRON AGE, New York

FOR SALE

Going operation on K. & M. Railroad near Charleston, West Virginia. Leasehold 1200 acres. Four workable seams. High-grade steam, gas and domestic coal. For sale cheap for cash. Now producing 150 tons per day. Can readily be increased to 300 tons. Owners must dispose of same for reasons that can be explained satisfactorily to purchaser. Address

212-213 Schultz Building
Columbus, Ohio

FOR SALE

FACTORY BL'D'G

OR RENT

Stone Factory in Berkshire Section of Massachusetts. Mill in section where all manufacturers seem to make big profits. Ready for immediate occupancy. Mill construction 156 ft. by 50 ft.; three floors, besides basement and attic. Almost 31,200 sq. ft. floor area; fully sprinkled. Abundant electric water power available from electric power plant next door and steam heat from lumber mill across the river. Save 50% of power and heat costs of many of your competitors. Ideal labor conditions and shipping facilities to all parts of the country.

For sale or to rent at about 50% of cost of any other property of similar value that we know of.

Apply to George A. Stevens, Great Barrington, Massachusetts, for full details, photograph, etc.

FOR SALE

Agricultural implement factory with good substantial trade. 6000 sq. ft. floor space in foundry and machine shop. Good buildings located on side track of good R.R. in southeastern Wisconsin.

ADDRESS BOX F-639
care of *The Iron Age*, New York.

FOR SALE

Machinery manufacturing business in Pennsylvania. Employ 80 men. Government work in addition to regular line of well-known tools. Book value about $125,000.00. Own foundry. Profitable.

Address BOX D-331,
care *The Iron Age*, New York.

Factories for Sale

By INDUSTRIAL LOCATING CO.

1206 Tribune Bldg.,

Chicago

Modern factory—70,000 sq. ft. floor; 8 ac. land; Penn. Rail. side track; all bldgs. sawtooth roof; all equipment; built 1912. Price $70,000.

Fcty.—20,000 sq. ft.; sawtooth roof, practically new. Price $12,000.

Modern fdry.—100x200; cupola, etc.; on C., M. & St. P., C. & N. W., C., B. & Q. Ry. Price $12,000.

1 sty. fine plant, 100,000 sq. ft., 5 acres with switches. Price $80,000.

Mch. shop and fdry., fully equipped; going concern; 50,000 sq. ft.; land 85,435 sq. ft.; R. R. siding. Price $136,000.

1 sty. brick, R. R. siding; 10 acres; boilers, eng. and crane; 75,000 sq. ft.

Lg. plant over 200,000 sq. ft. and 10 acres; power 350 Corliss; connected 200 K. W. generator, D. C.; equipped complete compressed air system. Price $250,000.

Also larger and smaller plants.

FOUNDRY FOR SALE

A Daylight Foundry suitable for gray iron or steel castings. Modern construction, excellent labor market. Good shipping facilities. Location in Central Pennsylvania.

ADDRESS BOX F-640
care *The Iron Age*, New York

Foundry For Sale

A Daylight Foundry suitable for gray iron or steel castings. Modern construction, excellent labor market. Good shipping facilities. Location in Southern Michigan.

ADDRESS BOX F-519
care *The Iron Age*, New York

A LARGE foundry and machine shop desires a machine or line of machinery to manufacture and sell, or manufacture only.

ADDRESS BOX F-540
care *The Iron Age*, New York

For Sale Machine Shop

in operation. About 30 Men, Manufacturing Line of Heavy Machinery, Custom Work and Repairs, Well Established. Located in Western New York.

ADDRESS BOX E-348
care *The Iron Age*, New York

FOR SALE

LARGE MODERN GOING GRAY IRON FOUNDRY

with 2—30-ton cranes and adjoining machine shop of desired. Two railroads and best of labor. Also an adjoining vacant site.

ADDRESS BOX F-157
care *The Iron Age*, New York

FOR SALE

Machinery for the manufacture of sewing machine needles. Capacity 200,000 per month. No individual machine will be sold.

ADDRESS BOX F-621
care *The Iron Age*, New York

CAPABLE, middle-aged business man of integrity, experienced in metal lines, will invest $5,000.00 to $10,000.00 with services in an established profitable business. Philadelphia or vicinity. Manufacturing preferred.

ADDRESS BOX 711
care *The Iron Age*, Real Estate Trust Bldg., Philadelphia, Pa.

FOR SALE AT GREAT SACRIFICE:—

Two manufacturing plants, one at Buffalo, New York, and one at Racine, Wisconsin, each containing about 150,000 sq. ft. of floor space. Adaptable for wood or iron work. Fully equipped with sprinklers, steam power, wood working machines. Racine plant has large foundry fully equipped. Can give immediate possession. If interested, communicate with

M. H. MURPHY,
Manitowoc, Wisconsin

SALES ENGINEER

Mechanical, Electrical, office 277 Broadway. Many years traveling, meeting executives largest companies. Would represent manufacturer Eastern territory, any high grade proposition. Export purchasing.

P. O. Box 861, New York

COMPLETE operating and sales organization desirous of forming connection with Foundry and Machine Shop owner.

Reply to BOX F-580
care *The Iron Age*, New York

Manufacturer's Attention

If you desire to be capably represented in Philadelphia territory, the world's shipbuilding and manufacturing center, write for the credentials of the undersigned, a young man with established office and business connections who is qualified by experience to handle iron, steel or allied products.

LYNN McMANUS
1519 Real Estate Trust Bldg., Phila.

WANT GOVERNMENT WORK?

No cancellation of orders or other troubles by our method of representation here. Get our proposition of how we are working for other manufacturers here.

National Manufacturers Bureau
906 Union Trust Bldg. Washington, D. C.

WANTED
SALES AGENCIES
Headquarters, Cleveland, Ohio

The advertiser is exceptionally well qualified by experience and education to handle metal and equipment accounts. Wide selling experience, education and practical experience along metallurgical and mechanical engineering lines.

ADDRESS BOX F-439,
care *The Iron Age*, New York

A MAN of many years' experience in handling accounts, bids, etc., before the government departments at Washington is open for engagement with one or more firms who desire to have a resident representative, but have not sufficient business to warrant the establishment of a branch office at the seat of government. Representative, 516 Kenois Bldg., Washington, D. C.

An Investment Wanted

advertisement in the Business Opportunities Section recently proved so efficient that you will be interested in knowing what the advertiser told us afterward. His letter says:

"REPLIES from our advertising were satisfactory, and at this minute, I am considering what is best to do in the matter. I consider that the answers I have received are entirely satisfactory and show the usefulness of THE IRON AGE as an advertising agency."

This will be of particular interest to everyone contemplating the addition of outside capital. To secure quickest results, put your announcement in this Section, run it under a box number for privacy, and similar results, we are confident, will follow naturally.

The Business Opportunities Section
The Iron Age

239 West 39th Street
New York City

THE WEEKLY MEETING PLACE OF EMPLOYER AND EMPLOYEE

HELP WANTED

H. H. Harrison & Co.

OFFERS

CONFIDENTIAL EMPLOYMENT SERVICE

TO

MANUFACTURING EXECUTIVES

TECHNICAL and COMMERCIAL MEN

Association Building Chicago, Ill.

To Manufacturers

We can furnish high grade Technical, Executive and Clerical help on short notice.

Write, phone or telegraph your requirements to the

National Employment Exchange
30 Church Street, New York City

A LARGE truck and automobile Company located in middle west has requested us to secure for them the following men:

PURCHASING AGENT..$5000-$7000
WORKS MANAGER ....$7000-$9000
SUPT. OF MAINTE- and EQUIPMENT ....$3000-$4000
GENERAL SUPT. OF ASSEMBLIES and MACHINE SHOP .....$3000-$4000

Give us full information first letter; all data confidential.

H. H. HARRISON & CO.,
19 So. La Salle St., Chicago, Ill.

ENGINEERS, Construction Engineers, Mechanical Draftsmen and Power Plant Designers. Apply Charles B. Buerger, Atlantic Refining Co., 3144 Passyunk Ave., Philadelphia.

MAN familiar with HIGH GRADE STEEL SPECIALTIES, with or without selling experience. State age, experience in detail; salary expected. Address Box E-587, care *The Iron Age*, New York.

SPECIAL OPPORTUNITY. GROWING FACTORY WANTS PRACTICAL MAN with energy and ideas and ability, who can furnish design for a single article on machine to manufacture. An arrangement will be made for remuneration to increase as sales do. Address Box E-948, care *The Iron Age*, New York.

Several first class MACHINE TOOL SALESMEN. Prefer men with actual selling experience, but will consider good practical shop men. Give references. Address Box F-119, care *The Iron Age*, New York.

HELP WANTED

SALESMEN.

We make a unique and liberal offer to good men in any part of the country who can find customers for wire rope, engines and boilers, hoists and derricks, locomotive and traveling cranes, machine tools, generating sets, etc., etc., etc. Salesman to find bona-fide customers and we do the rest on a 50-50 split of the net profits. Two references required with first letter. Address Box F-301, care *The Iron Age*, New York.

ENGINEER.—Office engineer to take charge of complete design of blast furnaces, steel plants, power plants, etc. Arthur G. McKee & Co., 1301 Rockefeller Bldg., Cleveland, Ohio.

A.A. Man competent to fill CLERICAL POSITION in iron and steel warehouse. To receive attention give experience, age and salary expected. Address Box E-917, care *The Iron Age*, New York.

An experienced STRUCTURAL STEEL DRAFTSMAN. Communicate with the National Steel Company, Havana, Cuba.

Several first class machine shop FOREMEN AND ASSISTANT FOREMEN. In answering give experience. Address Box E-915, care *The Iron Age*, New York.

METALLOGRAPHIST—Technical graduate for work in experimental laboratory of large New England manufacturing concern. Knowledge of Metallography of steel essential. Practical experience desirable, but not required. Address Box F-149, care *The Iron Age*, New York.

A MAN understanding Tool and Alloy Steels from actual shop experience who wishes to enter either sales or office end of steel distributing business. To receive attention, state age, experience fully, in confidence, salary expected. New York and Chicago. Address Box F-219, care *The Iron Age*, New York.

SUPERINTENDENT for the manufacture of rifle cartridges and bullets for new modern plant to be erected by an old established company extending its business. Also experienced bullet press maintenance mechanics. Tool Makers with bullet punch and die experience and inspectors. These are first class openings with a good future. Give full particulars, as all replies will be treated confidential, stating nationality, age, experience in detail, salary required to start and how soon available. Address "Bullet," Box F-544, care *The Iron Age*, New York City.

SUPERINTENDENT of small growing manufacturing plant at present employing fifteen men. Want a young man with mechanical and executive ability. Excellent future. Address Box F-545, care *The Iron Age*, New York.

A large pressed steel manufacturer engaged on government contracts has opening in Estimating Department for MAN having general TECHNICAL TRAINING. State age, experience, standing in military draft and salary desired. Address Box F-540, care *The Iron Age*, New York.

MASTER MECHANIC, draft exempt, for sheet metal plant manufacturing articles from 10-gauge and lighter. Must have had experience along these lines together with knowledge of drawing and forming dies. Preference will be given to the man who can eventually fill a higher position. Address Box F-550, care *The Iron Age*, New York.

HELP WANTED

A Manager

FOR OUR

Machinery Department

Must know values, understand buying and selling of heavy machinery, be a capable executive and be able to correctly and successfully carry through purchase and sales deals from inception to completion. The right salary to the right man. Give us full business history, salary expected, reference, etc., first letter. All replies confidential.

Walter A. Zelnicker Supply Co.

St. Louis, Missouri

Several draftsmen and checkers not subject to military duty, with general steel plant experience. State salary, education, experience and birthplace in first letter. Address Box F-669, care The Iron Age, New York.

FOREMAN for Header Department in a Machine Screw Factory located in the East. Permanent position, good pay. Must have executive ability and be familiar with Farrel Foundry and Manville cold heading solid die machines. Can also place several experienced operators. State age, experience, nationality, earliest date could report, and salary desired. Address Box F-546, care *The Iron Age*, New York.

MECHANICAL DRAFTSMAN, CHECKERS, DETAILERS, TRACERS. REPLY STATING EDUCATION AND EXPERIENCE IN DETAIL, AGE, PRESENT EMPLOYER, SALARY EXPECTED, WHEN AVAILABLE, AND RELATION TO DRAFT. UNITED STATES STEEL CORPORATION, ORDNANCE DEPARTMENT, AMBRIDGE, PA.

A thoroughly competent MASTER MECHANIC or MILLWRIGHT for SHEET MILL. Must be a man of good habits and capable of filling the position. State experience and rate of wages expected. Address Box A-286, care *The Iron Age*, 1002 Park Building, Pittsburgh, Pa.

HELP WANTED RATES

Set solid, minimum 50 words.....$2.00
Each additional word 4c
All capitals, minimum 50 words.....$3.00
Each additional word 6c
All capitals, leaded, minimum 50 words.$4.00
Each additional word 8c

SITUATIONS WANTED RATES

Set solid, minimum 25 words.....$ .50
Each additional word 2c
All capitals, minimum 25 words.....$1.00
Each additional word 4c
All capitals, leaded, minimum 25 words.$1.50
Each additional word 6c

DISPLAY ADVERTISING RATES GIVEN ON REQUEST

Count Seven Words for Keyed Address

Do not send original letters of recommendation in replying to advertisements—duplicates will answer the purpose. Letters forwarded without charge.

ADDRESS MAIL CAREFULLY IN ORDER TO AVOID DELAY IN FORWARDING

THE WEEKLY MEETING PLACE OF EMPLOYER AND EMPLOYEE

HELP WANTED

Chemist

Chemist for blast furnace work. Address, giving experience and full particulars.

DETROIT FURNACE CO.
Foot of Meldrum Ave., Detroit, Mich.

First class CHECKER and DESIGNER for general steel plant and blast furnace work for large Eastern corporation. Wages $215 per month. In answering, state age and experience in detail. Permanent position for right man. None but first class men need apply. Address Box F-575, care *The Iron Age*, New York.

WORKS MANAGER—An old established Strip Steel Company in the Pittsburgh District bearing an excellent reputation desires a Manager who can successfully handle a large force of employees. One who has had a metallurgical education and who has had experience in fine rolling preferred. Age between 35 and 40. Permanent and good position for satisfactory man. Address Box F-388, care *The Iron Age*, New York.

Three first class Rolling Mill DRAFTSMEN. National Tube Co., Wheeling, W. Va.

A FOREMAN for a small Structural Steel Shop. In answering, state age, experience and wages desired. 440 Lonja Del Comercio Bldg., Havana, Cuba.

Thoroughly experienced TOOL STEEL SALESMAN. State full particulars, giving previous connection, salary expected, age, etc. Address Box F-436, care *The Iron Age*, New York.

METALLURGIST to take charge of physical and educational investigation connected with the manufacture of high speed tools. Applicant must have had experience in directing similar work and must be equipped with knowledge that will produce results from the start. Works located in Chicago, and opportunity for good, permanent position is especially promising. Address Box F-610, care *The Iron Age*, New York.

Chief Engineer

TO TAKE FULL CHARGE OF THE ENGINEERING DEPARTMENT OF A LARGE COMPANY MANUFACTURING VALVES AND FITTINGS, LOCATED NEAR NEW YORK CITY. NOTHING BUT A HIGH CLASS ENGINEER WITH PREVIOUS EXPERIENCE IN THIS LINE OF WORK WANTED.—PERMANENT AND GOOD POSITION FOR THE RIGHT KIND OF A MAN. STATE SALARY, PREVIOUS TECHNICAL AND PRACTICAL EXPERIENCE AND IF OPEN FOR IMMEDIATE POSITION.

Address Box F-609, care The Iron Age, New York, N. Y.

HELP WANTED

Experienced man as SUPERINTENDENT in Pieced Tin Ware factory in the South, one who has practical experience, understanding Die and Press Work, with executive ability to handle 150 men and women in factory. Good opportunity for right man. Must be well recommended. State salary expected and give full particulars. Address Box F-606, care *The Iron Age*, New York.

SALESMAN who is thoroughly conversant with iron and steel products for work in Central West. Reply fully. Full confidence given. Address Box F-611, care *The Iron Age*, New York.

A man with experience in flanged fittings. Long established firm, operating large foundry and machine shop, making steam and water specialties, can use the services of a man who has successfully supervised the design, manufacturing and handling of flanged fittings. Permanent, well paid position for man with proper qualifications. In answering state age, experience and full information. Address Box F-603, care *The Iron Age*, New York.

COLD ROLLED STRIP STEEL GENERAL FOREMAN. MAN CAPABLE OF TAKING ENTIRE CHARGE OF ALL DEPARTMENTS, PRODUCING BOTH QUALITY AND TONNAGE. GIVE FULL DETAILS OF PAST EXPERIEN E. ADDRESS BOX F-593, CARE *THE IRON AGE*, NEW YORK.

New steel foundry on Government work requires the services of foundry FOREMAN and acid open hearth MELTER. Excellent opportunities offered right men. State age, experience and other qualifications. All correspondence held strictly confidential. Address Box F-598, care *The Iron Age*, New York.

Machinery Salesmen

We can use 3 or 4 good live Salesmen for Michigan territory. Must know both new and used equipment.

State experience and salary expected.

ADDRESS BOX F-202
care *The Iron Age*, New York

TEN DRAFTSMEN—At once for permanent positions with new steel plant just starting operation on Navy work. Only men having steel mill experience need apply. State full particulars, salary expected and availability. Address Chief Engineer, Erie Forge & Steel Co., Erie, Pa.

CHIEF DRAFTSMAN TO TAKE CHARGE OF DRAFTING ROOM EMPLOYING ABOUT 12 MEN. APPLICANTS MUST HAVE HAD AT LEAST TWO YEARS' EXPERIENCE AS CHIEF DRAFTSMAN. ONE WHO HAS HAD CONVEYOR EXPERIENCE PREFERRED. GIVE FULL DETAILS SUCH AS AGE, EXPERIENCE, SALARY EXPECTED AND WHEN AVAILABLE IN FIRST LETTER. ADDRESS MATHEWS GRAVITY CARRIER CO., ELLWOOD CITY, PA.

CHECKERS and DRAFTSMEN—Tennessee Coal, Iron & Railroad Company requires men experienced in steel plant work. Apply, giving education, experience, salary and reference to R. E. Brakeman, Chief Engineer, Fairfield Works, Birmingham, Alabama.

HELP WANTED

CHEMIST

To take charge of chemical laboratory in large factory using alloy and carbon steels.

Must be expert steel analyst and should be familiar with oil, coal, boiler water, etc. Location near New York City.

Give full particulars, strictly confidential.

ADDRESS CHEMIST,
Box 810 Broad St., Newark, N. J.

Patriotic mechanical draftsmen

for work on aircraft. Good propositions to experienced men. Fine opportunity for advancement. Write Employment Manager,

THOMAS-MORSE
Aircraft Corporation, Ithaca, N. Y.

Experienced man who is thoroughly acquainted with figuring weights and extras over base prices on plate, angles, flats, rounds, etc., for shipyard use. This man must also be familiar with the keeping of steel stores ledgers. A reasonable salary will be paid for this position. If you are not experienced with this kind of work do not waste your time in answering this advertisement. Apply to A. L. Oertel, Pur. Agt., Groton Iron Works, Groton, Conn.

Experienced MECHANICAL DRAFTSMAN. One familiar with the design and construction of sheet metal working presses preferred. Apply The Toledo Machine & Tool Co., Toledo, Ohio.

PATENT DRAFTSMAN capable of making first-class drawings of machinery and of assisting patent attorney. Opportunity for one with ambition and ability. Address Patent Attorney, Norton Company, Worcester, Mass.

PLANT ENGINEER to look after installation of machinery, maintenance of building, power, equipment and motors. Preferably a man over 31 years and a graduate engineer preferred, experienced in piping, millwrighting and machinery installation. State full particulars, salary desired to start, and how soon available. All replies treated confidential. Location Philadelphia. Good opening with large growing concern. Address Plant Engineer, Box F-661, care *The Iron Age*, New York.

DEPARTMENTAL SUPERINTENDENT

FOR A LARGE MANUFACTURING COMPANY WHO HAVE BEEN ENGAGED A GREAT MANY YEARS MAKING IRON AND BRASS VALVES AND PIPE FITTINGS, EMPLOYING ABOUT 1000 MEN, LOCATED NOT FAR FROM NEW YORK CITY. PERMANENT AND GOOD POSITION FOR THE RIGHT KIND OF A MAN. NO APPLICANT CONSIDERED WHO HAS NOT HAD PREVIOUS EXPERIENCE IN THIS LINE OF WORK. STATE FULLY PARTICULARS AS TO PREVIOUS EMPLOYMENT AND IF OPEN FOR AN IMMEDIATE POSITION, ALSO SALARY EXPECTED.

Address Box F-608, care The Iron Age, New York City

HELP WANTED RATES

Set solid, minimum 50 words.....$2.00
Each additional word 4c
All capitals, minimum 50 words.....$3.00
Each additional word 6c
All capitals, leaded, minimum 50 words.$4.00
Each additional word 8c

SITUATIONS WANTED RATES

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Each additional word 4c
All capitals, leaded, minimum 25 words.$1.50
Each additional word 6c

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ADDRESS MAIL CAREFULLY IN ORDER TO AVOID DELAY IN FORWARDING

THE WEEKLY MEETING PLACE OF EMPLOYER AND EMPLOYEE

HELP WANTED

ELECTRIC WINDING ROOM FOREMAN; man with production experience, one capable of taking charge of entire department for executing complete output. Address Box F-662, care *The Iron Age*, New York.

PRIVATE SECRETARY and GENERAL OFFICE ASSISTANT to President of Steel Company; must be familiar with steel manufacture, analysis of daily and monthly reports and general conduct of the business. Location, New York city. State age, experience and salary expected. Address Box F-660, care *The Iron Age*, New York.

Experienced Core Room FOREMAN for Malleable Foundry located in Middle West. State experience and salary wanted. Address Box F-656, care *The Iron Age*, New York.

SALESMAN who is caling on the aeroplane manufacturers, munitions and shipbuilding plants. We make a trade name soldering appliance which is a necessity and is easily sold. We pay a liberal commission. Address Box F-643, care *The Iron Age*, New York.

Steam shovel SUPERINTENDENT, capable of selecting his own equipment and running same at top efficiency. Permanent position on manganese open cut mine in excellent location, where cost of living is far below present day standards. Give references and state salary requirements in first letter. Address Box F-654, care *The Iron Age*, New York.

STRUCTURAL fitters, machine riveters, blacksmiths and foremen. Good openings for reliable men. Good working and living conditions. In reply state nationality, wages and date you could report for work. Apply

CANTON BRIDGE CO.,
Belden Ave. & 10th St., N. E.,
Canton, Ohio.

BOOKKEEPER—Woman having accounting and stenographic experience in iron and steel business preferred. State fully, in confidence, qualifications, experience, salary desired. Address Box F-653, care *The Iron Age*, New York.

MELTER and FIRST HELPER for ten tons acid open hearth on Canadian Pacific Coast. Address Box F-651, care *The Iron Age*, New York.

CORRESPONDENCE SERVICE, GENERAL ENGINEERING AGENCY, Jenkins Arcade, Pittsburgh, Pa. Solicits confidential records of Managers, Superintendents, Engineers, Mechanics and Draftsmen for our correspondence work among employers. Our Mr. Parker calls personally on executive heads all points between New York and Chicago. Straight commission service, moderate. Established 1909. Salaried men $1,000.00 to $10,000.00 yearly.

Large export house wants expert MALE STENOGRAPHER conversant with export and import business. Must be good at figures and preferably have knowledge of buying and figuring quotations on steel material. Address, stating experience in full and salary desired. Address Box F-638, care *The Iron Age*, New York.

HELP WANTED

MECHANICAL ENGINEER for checking and laying out on rolling mill and general steel plant. Salary $200.00 per month. In answering state age and experience in detail. None but first class men need apply. Address Box 902, care *The Iron Age*, Real Estate Trust Bldg., Philadelphia, Pa.

ASSISTANT CHEMIST experienced in Blast Furnace and Coke Oven Analytical Work. Plant situated at Lake Port. Man with technical training desired. Address Asst. Chemist, Box F-663, care *The Iron Age*, New York City.

Steady, reliable, experienced FOREMAN for core room, with large steel foundry. Salary $150.00 per month, with bonus now amounting to 50%. State experience in detail. Address Box F-516, care *The Iron Age*, New York.

If actually qualified for position carrying salary between $2,500 and $25,000, communicate with the undersigned, who will negotiate confidential preliminaries for such positions; executive, administrative, technical, professional; all lines. Negotiations so conducted as to avoid jeopardizing present connections; complete privacy asured. Not an employment agency; undersigned acts in direct confidential capacity. Established 1910. Can accept only cases of the grade indicated. Special inquiries at this time for (1) mechanical engineer, machinery house; (2) general executive, farm implement and carriage manufacturers, (3) office manager for manufacturer automobile parts; (4) factory accountant for machinery manufacturer; (5) advertising manager, stove manufacturer; (6) efficiency engineer, metal ware company. Send name and address only for preliminary details before submitting your requirements. R. W. Bixby, K64-66 Niagara Street, Buffalo, New York.

SITUATIONS WANTED

ELECTRIC STEEL—If you are looking for an experienced man to put in or operate an electric furnace in your foundry address Box F-543, care *The Iron Age*, New York.

SUPERINTENDENT Basic open hearth; experienced, practical man wants position as open hearth superintendent with reliable concern; years of experience with Carnegie Steel Co.; furnish high class references. Address Box F-523, care *The Iron Age*, New York.

WORKS or FACTORY MANAGER wishes new connection. Specialist in handling large organiations for economical quantity-production of high class, small and medium sized metal products of steel, iron or brass; auto parts and accessories to munitions in all necessary finishes. Broad experience in business. Succesful record of 18 years' executive experience. Salary $5.000.00 at start. Attractive personality. Character, habits and *business* record open to investigation. Address Box 825-A, care *The Iron Age*, 1505 Otis Bldg., Chicago, Ill.

SUPERINTENDENT — By a successful, practical man, one who is familiar with the construction of furnaces, chemistry, operation of furnaces and the manufacture and heat treatment of all kinds of alloy steels. Address Box F-230 care *The Iron Age*, New York.

Experienced steel FOUNDRYMAN desires a position of responsibility with field for advancement. Experience covers converters and Heroult electric furnaces. Address Box F-522, care *The Iron Age*, New York.

SITUATIONS WANTED

SALESMAN open for position, manufacturing, wholesale, retail hardware or metal firm. Either manager, road or floor salesman. 25 years' experience in hardware and other lines. Best of references. Address Box F-566, care *The Iron Age*, New York.

GENERAL MANAGER — SALES MANAGER—Young man at present general manager of well known company will consider a change. Experienced executive with well grounded manufacturing and sales experience. Technically trained and capable of handling complete organization. Will consider management of sales department or important branch office. Location in Pittsburgh District or Ohio preferred. Address Box F-625, care *The Iron Age*, New York.

MASTER MECHANIC—Chief Engineer (Licensed) or Superintendent of Construction and Erecting Engineer open for a change. A. C. and D. C. electrical experience. Address Box F-619, care *The Iron Age*, New York.

FACTORY MANAGER or SUPERINTENDENT—At present in charge of factory producing light and heavy machine tools. Capable designer of heavy tools, and can develop same from drawings to finished machines in record time, including jigs and tools, for rapid and accurate manufacture of same. Prefer plant which has not been giving proper return on investment. Age 32. Energetic, resourceful. Good reason for change. Only permanent position considered. Salary $5,000 minimum, or salary and bonus. Address Box F-564, care *The Iron Age*, New York.

MASTER MECHANIC and GENERAL MILL MAN in steel plant; New York vicinity preferred. Address Box F-600, care *The Iron Age*, New York.

Practical STEEL FOUNDRY MAN desirous of making a change would like to hear from foundry in need of superintendent. Am experienced in open hearth or converter and can furnish A-1 references. Address Box F-612, care *The Iron Age*, New York.

FACTORY SUPERINTENDENT by man 41 years of age, technically trained, inventive, mechanical and executive ability, with firm manufacturing line of small or medium size machinery employing 25 to 150 men, operating machine shop, woodworking and foundry. Employed at present; wish to make a change. Address Box F-607, care *The Iron Age*, New York

WORKS CHEMIST OR SUPERINTENDENT.—Long experience in steel, wire, car works. Analyze anything. Some mechanical and buying experience. Address Box 1061-A, care *The Iron Age*, 1505 Otis Bldg., Chicago, Ill.

Position as FOREMAN by an executive with several years' experience, who is thoroughly familiar with machining and assembling of hardware. Capable of handling help, male and female, with high record of production. Best reference furnished if desired. Address Box F-542, care *The Iron Age*, New York.

Well trained EXECUTIVE now in charge of large manufacturing plant desirous of bettering himself seeks change. Age 38. Twenty-two years' experience in office, selling, buying and factory work with progressive firms manufacturing brass and iron products. Has ability to manage by up-to-date and sensible method. Address Box F-604, care *The Iron Age*, New York.

HELP WANTED RATES

Set solid, minimum 50 words.....$2.00
Each additional word 4c
All capitals, minimum 50 words.....$3.00
Each additional word 6c
All capitals, leaded, minimum 50 words.$4.00
Each additional word 8c

SITUATIONS WANTED RATES

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Each additional word 2c
All capitals, minimum 25 words.....$1.00
Each additional word 4c
All capitals, leaded, minimum 25 words.$1.50
Each additional word 6c

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Count Seven Words for Keyed Address

Do not send original letters of recommendation in replying to advertisements—duplicates will answer the purpose. Letters forwarded without charge.

ADDRESS MAIL CAREFULLY IN ORDER TO AVOID DELAY IN FORWARDING

THE WEEKLY MEETING PLACE OF EMPLOYER AND EMPLOYEE

SITUATIONS WANTED

POSITION BY BY-PRODUCT OVEN SUPERINTENDENT, NOW EMPLOYED, BUT DESIRES CHANGE. WILL ACCEPT LOWER POSITION IN LARGER PLANT WHERE OPPORTUNITIES EXIST FOR ADVANCEMENT. ADDRESS SUPERINTENDENT, BOX F-453, CARE *THE IRON AGE*, NEW YORK.

INVESTIGATING, SECRET SERVICE and SYSTEMATIZING of shops. An American machinist with 15 years' experience. Will adjust all trouble confidentially. Address Box F-420, care *The Iron Age*, New York.

SUPERINTENDENT OR PRODUCTION MANAGER—Technical graduate, strong disciplinarian, successful handler of men, well up on efficiency, rate setting, cost accounting and modern shop management, desires new connections with company operating foundry or machine shop or both. Address Box F-425, care *The Iron Age*, New York.

SALESMAN—An able, energetic man with a wide acquaintance and experience in the iron and steel trade through New England desires to represent a first class house in this territory. Highest references. Address Box F-452, care *The Iron Age*, New York.

Electric Steel MELTER, ten years' experience with one to five ton furnaces, seeks position; has melted steel for small and large steel castings, also steel ingots; age 38; good references. Address Box F-597, care *The Iron Age*, New York.

ROLLER, guide mill, open for engagement; used to all kinds sections. Address Box F-595, care *The Iron Age*, New York.

WORKS MANAGER or GENERAL SUPERINTENDENT, 22 years' experience, machine tools, ordnance, hydraulic machinery, gas engines, etc., covering machine shop, foundry, smith shop, boiler shop, drawing room; 16 years in executive positions both in design and production. Address Box F-667, care *The Iron Age*, New York.

Plow, Plate, Sheet and Tin Bar, also Muck Bar ROLLER open for a position. Can go any place. Address Box A-287, care *The Iron Age*, 1002 Park Building, Pittsburgh.

MECHANICAL and CIVIL ENGINEER, 38, graduate, married, 18 years' experience with steel plants, both field and office, mill construction, rolling mills, furnaces, hydraulic machinery, coke ovens, by-products, piping, buildings and power plants desires change of position. A draftsman's position will not be considered. Address Box F-664, care *The Iron Age*, New York.

WORKS MANAGER OR SUPERINTENDENT, BY A MAN WITH AN EXTENSIVE AND SUCCESSFUL EXPERIENCE IN WELL KNOWN PLANTS. THOROUGHLY FAMILIAR WITH MOST EFFICIENT METHODS, RESOURCEFUL, AND A GOOD ORGANIZER, PHYSICALLY AND MENTALLY PREPARED TO ASSUME RESPONSIBILITY. ADDRESS BOX F-583, CARE *THE IRON AGE*, NEW YORK.

Having had considerable experience in the sale of goods to manufacturing trade, at present with steel concern, would consider a line for Central States; can furnish required references; would be pleased to communicate with any reliable company desiring such a man; I have had considerable experience in traffic and purchasing department. Address Box F-635, care *The Iron Age*, New York.

WORKS MANAGER—METALLURGICAL ENGINEER, 35, STEADY, WELL BALANCED, RELIABLE, TWELVE YEARS' STEEL WORKS EXPERIENCE AS CHIEF CHEMIST, METALLURGIST AND SUPERINTENDENT, PRACTICAL OPEN HEARTH AND ELECTRIC FURNACE MELTER, FAMILIAR WITH MANUFACTURE OF SHELL STEEL INGOTS, ROLLING MILL OR FOUNDRY WORK, WISHES TO FORM SUITABLE NEW CONNECTION. ADDRESS H. A., BOX F-665, CARE *THE IRON AGE*, NEW YORK.

STEEL BARREL FACTORY SUPERINTENDENT, practical mechanic, capable of designing dies, desires connection to install or operate plant; at present employed. Address Box F-666, care *The Iron Age*, New York.

BY-PRODUCT COKE SUPERINTENDENT, SEVERAL YEARS' EXPERIENCE IN THE MANUFACTURE OF BY-PRODUCT COKE, OPEN FOR ENGAGEMENT. ADDRESS BOX F-636, CARE *THE IRON AGE*, NEW YORK.

PURCHASING, STORES, ACCOUNTING. Married man, forty-three years old, successful experience as RAILWAY STOREKEEPER, OFFICE MANAGER, and as AUDITOR for manufacturing stock company wishes connection with an essential industry. The Advertiser is NOT A PROFITEER, and an offer from a non-essential industry will not be considered at any salary. Address Box F-637, care *The Iron Age*, New York.

POSITION AS CHIEF DRAFTSMAN (Bolt and Nut Mfg. Co. preferred) by experienced, practical man in same position; also as superintendent of pattern shop; can give excellent references, also satisfactory reasons for desiring change. Address Box F-462, care *The Iron Age*, New York.

PRACTICAL DROP FORGER, TOOL DESIGNER AND EXECUTIVE MAN; 20 years' experience making forgings of all descriptions and designing forge and upsetter tools; heavy forgings a specialty; six throw cranks, truck axles, etc.; will accept foreign position; now holding responsible position; can furnish references. Address Box F-642, care *The Iron Age*, New York.

METALLURGIST or CHIEF CHEMIST—Graduate, four years' experience as metallurgist and chief chemist on basic open hearth, blast, electric and crucible furnaces, carbon and alloy steels, high speed tool steels, heat treatment, physical tests and chemical analysis open for engagement at once. Best references. Executive ability. Salary desired $2,400 per annum. Address Box F-644, care *The Iron Age*, New York.

MECHANICAL ENGINEER; age 35; machine shop and designing experience; seven years in charge of men; technical graduate, practical, energetic; responsible position desired. Address Box F-645, care *The Iron Age*, New York.

I DESIRE TO MAKE CHANGE IN PRESENT POSITION. HAVE HAD EIGHTEEN YEARS' SALES EXPERIENCE IN IRON AND STEEL BUSINESS IN NEW ENGLAND, LAST EIGHT YEARS AS EXECUTIVE AND IN CHARGE OF SALES. AM FAMILIAR WITH ROLLING MILL AND STEEL FOUNDRY PRACTICE. AGE 37. ADDRESS BOX F-646, CARE *THE IRON AGE*, NEW YORK.

MELTER—A man of 14 years' experience, acid or basic; at present employed; best of reference; steel casting, ingots or shell steel. Address Box F-565, care *The Iron Age*, New York.

ACCOUNTANT (32), experienced in Corporation Accounting, Iron and Steel Costs and Cashiering, desires executive position offering opportunity for advancement. Address Box F-482, care *The Iron Age*, New York.

Patent Attorney, graduate MECHANICAL ENGINEER, efficient machine designer and able inventor, with 17 years of varied experience. I. Benjamins, 72 Grand Avenue, Brooklyn, N. Y.

PURCHASING AGENT or OFFICE MANAGER; twelve years' experience buying iron and steel and metal products, raw materials, general factory and foundry supplies. Address Box F-652, care *The Iron Age*, New York.

An Expert Spanish and French CORRESPONDENT (27) fluent English, desires to connect with reliable firm. Man who has traveled extensively. Good connections. Motor vehicle experience. Best of references. Address Box F-650, care *The Iron Age*, New York.

Aggressive young man, 25 years of age, good education, desires to represent reputable house in vicinity of Washington and Baltimore. Salary secondary compared with good future. Established first class house only need answer. Address Box F-655, care *The Iron Age*, New York.

A Holland gentleman of confidence, speaking and writing fluently French and Spanish besides English and Dutch, having been engaged 1½ years by the British Government, now working in the Accounting Department of a large steel plant, seeks to better his position. Address R. M., Box F-657, care *The Iron Age*, New York.

Metallurgist—Graduate from metallurgical department of Technical School. Seven years' practical experience and has specialized in heat treatment. Has had experience in chemical, physical and metallography laboratories. Has installed heat treating equipment and organized heat treating department. Thoroughly experienced in carbonizing, tool hardening and pyrometry. Desires to locate in the East. Address Box F-659, care *The Iron Age*, New York.

STEEL SALESMAN — AMERICAN, 35; ELEVEN YEARS' EXPERIENCE, THOROUGHLY CONVERSANT WITH STEEL BUSINESS IN GENERAL, WISHES TO CONNECT WITH RELIABLE FIRM FOR CONNECTICUT TERRITORY. ADDRESS BOX F-670, CARE *THE IRON AGE*, NEW YORK.

Situation as GENERAL SHOP FOREMAN, assistant to superintendent, or shop superintendent of structural plant. Available July 15th. Address Box C-410, care *The Iron Age*, 536 Guardian Bldg., Cleveland, Ohio.

WANTED—To hear from reliable concerns needing the service of ambitious man of six months' experience on boring machine and automatic screw with large concern. Have mechanical ability, also inventive ability. Have several good patents, and will allow concern offering me desiraole position an opportunity to manufacture my patents on royalty. G. E. Carter, Erwin, Tenn.

HELP WANTED RATES

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Each additional word 4c
All capitals, minimum 50 words.....$3.00
Each additional word 6c
All capitals, leaded, minimum 50 words.$4.00
Each additional word 8c

SITUATIONS WANTED RATES

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See Page 190 issue January 17th, 1918

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Special milling cutters, reamers, jigs fixtures, screw machine tools, engraved dies, machine parts, flat and round machined and ground to correct size. Light and heavy stampings and assembling.
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Send your specifications for estimates

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Tell Us Your Requirements for Stampings

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STAMPINGS
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Not heavier than 24 gauge.
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Brass or Steel.
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If it's made of Steel, Iron and Brass, we can do it RIGHT

Stamping, Turret, Screw Machine, Enameling, Plating, Etc.

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BRASS AND ALUMINUM CASTINGS
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of any description. Attention given to special construction in copper and brass. Send us sample or blueprint.

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Dies, punches and special tools.
Special equipment to manufacture all kinds of specialties.

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It is important that dies be made to stand the test of practical everyday use.
We know from experience what is required of dies, which enables us to design and construct them to give the best service.
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Light machine, die and stamping work in iron, steel, brass, aluminum and other metals. Will take orders too small for the "big fellows," and guarantee quality and prompt deliveries.
Capacity for light weight castings.

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WE OFFER
QUALITY—SERVICE—PRICE

Let us figure on your Punchings, Stampings, Screw Machine Products, Tools, Tinplating, etc.

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CLARENCE SCHOCK, Pres.
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metal stampings, difficult pressed shapes or sheet metal specialties from us.

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Especially equipped to handle difficult stamping and deep drawn work.

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Stamping, Drawing and Spinning. Equipped to do plating and finishing on all Metals.

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Send us your samples or drawings for prices.

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High Grade Stampings and Drawings

in all metals

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The Superior Metal Products Co.
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Special Parts to Order
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SCREW MACHINE PRODUCTS
Expert Die Makers
Buffing, Polishing, Plating and Special Finishes
Estimates cheerfully furnished
Send Drawings, Specifications or Samples

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Get our prices—find out what we can do for you and how quickly we can do it. Difficult work has no terrors for us. We'll prove it.

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Experimental and Model Work. Special Machinery. Punching and Forming Dies. Novelties and Patented Articles manufactured by contract. Get in touch with us.

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SPECIAL MACHINERY—MACHINE WORK—PRESS WORK
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RATES—ONE INCH SPACE $2.25 PER INSERTION ON YEARLY BASIS.
RATES FOR SHORTER RUNS OR OTHER SPACES FURNISHED ON REQUEST.

Let Us Make Your Stampings

We have the equipment and the men to make your stampings—either large or small.

Send blueprints or samples for estimates.

Also have facilities for making your tools, punches and dies.

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QUICK SERVICE ON

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Also die, tool and experimental work.

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STAMPINGS

(light steel)
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Ample sources of supply. Thirty years' experience. Parts assembled in our
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We Make Your Dies at Cost

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30
PRESSES
AT YOUR SERVICE

Send Us Your Inquiries
For Our Quotation.

FORT DEARBORN MFG. CO.
Incorporated 1895

Works STERLING, ILL.
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Six Successful Years

The England Manufacturing Co.

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Metal Stampings

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Formerly Voelkner & Harry Mfg. Co.
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Punch Press Work.
Hardware specialties manufactured to order.
Special Machines built to order.

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Up to 3 1-4"

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WE are equipped to do any quantity of forming, Stamping and Drawing, in sheet Metal, Heavy or Light, Large or Small. Correspondence Solicited.

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Modern equipment to handle brass or steel up to 2" diameter.

PROMPT DELIVERY.

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BRASS SCREW MACHINES PRODUCTS

Ranging from ⅛" to 2½" diameter. We have large and excellent facilities, and if it can possibly be made on a screw machine, we can make it. Send us your blueprints or samples and we will quote you prices.

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SCREW Machine Products from ⅛" dia., up to 1⅝" inclusive, made from brass, iron, steel, German silver, etc. From rods or tubing. Special work a specialty.

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Plainville, Conn.

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AUTOMATIC SCREW MACHINE PRODUCTS

We specialize in small, accurate brass work up to five-eighths of an inch diameter.

SCREW MACHINE PRODUCTS

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Phone Bristol Division

Screw Machine Products

⅛" to 1¼" diameter. Low prices consistent with accurate work.

Let me quote you.

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Screw Machine Products

Work up to 2¼" diameter can be handled with our increased facilities.
Send us your specifications.
THOS. H. DALLETT CO.,
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Screw Machine Products

Send us your inquiries.
Prompt delivery.

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SCREW MACHINE PRODUCTS

Good deliveries on
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ONTARIO MACHINE SCREW CO.
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Screw Machine Products

Let us have your requirements. We also make stampings and have a modern machine shop, thoroughly equipped. Can we serve you?

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HIGH GRADE DUPLICATE PARTS

which are
TURNED-HARDENED AND GROUND
Screw machine work—2½" to 4½" diameter.
Send drawing and blue prints for quotations.
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Capacity up to 1⅝".

We Manufacture Automobile Parts, Airplane Parts, etc. Give our service a trial.

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Let us figure on your requirements.

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WE WANT:

Contracts for Screw Machine Products

Material from ¼ in. to 3¼ in. Light or Heavy Press Work. New Specialties developed. Send Blue Prints or Drawings for quotations.

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Our Specialty Prices Right

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Special machine work of all kinds.

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GEARS CUT RIGHT AND CUT QUICK

We have the facilities, the men and the equipment to do your work and do it right. Send us your specifications. We will act promptly.

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Machine Work Wanted

For Lathes, Planers, Boring Mills, Shapers, Screw Machines, Millers, Bolt Cutters, Drill Presses, etc.

SPECIAL MACHINERY BUILT TO ORDER.
For ACCURACY — DELIVERY — PRICE write

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Get our prices on your

Contract Work

Surplus capacity for good grade flat or vertical turret work, spur gear cutting, hardening and grinding. Send us your blue prints on quantity work.

Office and works,

South Easton, Mass.

Facilities for
General Machine Work

That can be handled on lathes, planers, milling machines, drill presses, etc. Let us know what you require. We will do the rest.

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ALSO
MACHINE WORK
Quantity Production
At Lowest Prices on Our

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Wanted for Lathes, Planers, Millers, Drill Presses, Etc.
Special Machinery Built

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We Can Handle
LIGHT MACHINE WORK
of Every Description
What Can We Do for You?

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All varieties of cams, from 36 in. diameter down to the smallest. Special prices on large quantities. Cam cutting machines in stock.
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Screw Machine Products.
Special Machinery
EXPERIMENTAL AND MODEL
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Lathe, Milling Machine, Drill Press, Stamping Press and Screw Machine Products up to 1 15/16". Send us samples or Blue Prints for quotation.

THE CLARK NOVELTY CO., INC.,
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Gear Cutting Done Promptly

The West Side Foundry Co., Troy, N. Y., has large facilities for cutting gears, and they will be very glad to figure on your requirements.

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RATES—ONE INCH SPACE $2.25 PER INSERTION ON YEARLY BASIS.
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QUANTITY work wanted for large and medium size lathes. Equipment available at present. Prompt delivery assured.

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From 1 Ounce to 5,000 Pounds

This is our limit.

Send us your drawings and specifications, we can execute your work to entire satisfaction. Electrical and mechanical instruments, tools, dies, drill-jigs, fixtures, gauges, automatic machinery for all purposes. Our factory and engineering department is at your service.

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55-57 West 3rd Street, New York

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WANTED for turret lathes, bar and chucking, milling machines, engine lathes and radial drills. Mail us your B/Ps.

THE W. W. OLIVER MFG. CO.
Buffalo, N. Y.

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Lathe work in quantity for lathes 12" to 20" swing. Also Turret lathe work, both bar and chuck, for J. & L. Machines.

Send us your blue-prints.

Jersey City Machine Co.
Jersey City, N. J.

10 Minutes from lower New York City

GEARS
and GEAR CUTTING

Spur up to 42", Bevel up to 24"
Helical up to 30"

WORMS, WORM WHEELS and INTERNALS

NILSON-MILLER CO., Hoboken, N. J.

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We have facilities for handling in large quantities work up to 2" diameter. Special equipment for nuts, bolts, sleeves, etc. Write us for estimates and deliveries. We are also large manufacturers of Grease Cups.

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Heavy Machine Work and Special Machinery

A modern plant with 54 years' experience.

Send us your inquiries

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Manufacturing Engineers
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Prompt Shipments Accurate Work Right Prices

ON ALL KINDS OF
LIGHT OR HEAVY

Machine Work

BORING
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TURNING
DRILLING

SEND US YOUR INQUIRIES TO-DAY

Pittsburgh Reinforced Brazing & Machine Co.
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OPEN FOR
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Small Gear Cutting and J. & L. Turret Lathes
PROMPT DELIVERIES
ACCURATE WORK

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General Machine Work
Gear Cutting
Special Machinery

Our shop is equipped for handling work as mentioned above. Estimates will be gladly furnished.

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We offer prompt service on medium and light work requiring more than ordinary care. We have a modern shop and skilled mechanics under the personal supervision of W. S. Giele, mechanical engineer. We can also handle your castings.

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I am equipped to do high-grade and accurate machine work.

Send your blueprints and get my prices. Prompt deliveries guaranteed.

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Send in your inquiries

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We will furnish your
High Grade and Accurate
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We have a completely equipped plant for manufacturing parts of all kinds. Mail blue prints for quotation.

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Open for Machine Work

BARNES MANUFACTURING CO.
Established 1834

MANUFACTURING ENGINEERS
MACHINISTS
Lanesboro, Penna.

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FOUNDRY WORK — AUTOMATIC SCREW MACHINE WORK

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RATES FOR SHORTER RUNS OR OTHER SPACES FURNISHED ON REQUEST.

ALL KINDS OF MACHINE WORK

Engineers' and Machinists' Factory and Mill Supplies

Foltz Manufacturing & Supply Co.
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Machine Contract Work
WANTED

Thoroughly equipped with modern machine shops we can render prompt and efficient service.
SPECIAL MACHINERY BUILDING AND CONTRACT FOR PARTS SOLICITED

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Vertical Boring Mills

We have several Boring Mills ranging from 30 to 52" swing which we could use for new work.

THE BRIDGWATER MACHINE COMPANY
AKRON, OHIO

GENERAL MACHINE WORK

50 Machines, Lathes, Screw Machines, Turrets, Planers, Shapers, Grinders, Broaches, Drills and Special Equipment.
Send us your inquiries.

THE WILL-BURT CO., Orrville, Ohio

Machine Work

We are thoroughly equipped with modern machinery and can render prompt and efficient service.
Send blueprints for estimate.

Kremer-Cummins Machine Company
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Machine Work That's Done Right

With the equipment we have, our facilities are such that we can do your work and do it right. We can also handle gray iron castings up to about 4000 lbs. Our brass foundry pattern and smith shop is also at your disposal. What can we do for you?

Klotz Machine Company, Sandusky, Ohio

Machine Work Wanted

for lathes, 12" to 28" swing. Competent machinists. Accurate work.
Send blue prints for estimates

THE B. & A. MACHINE WORKS
317 S. Clinton Street Chicago, Ill.

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We have thoroughly equipped modern machine shop to do high grade and accurate machine work. We also build special machinery. Let us quote on your requirements.

The Charles Stecher Co.
1574-80 Crossing St., Chicago, Ill.

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We want Special Machinery and Parts to manufacture.

Peoria Machine & Supply Co.
PEORIA, ILLINOIS

FORGED round 3" to 15" dia. Gear blanks all sizes. Shaftings all sizes on stock. Prompt Delivery.

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We have a number of Milling Machines, Profilers, Drill and Punch Presses which are suitable for the manufacture of small articles in large quantities. Fine work and duplicate parts our specialty. Other equipment available. Let us figure with you.

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Screw machine products, metal stampings, and specialties, lathe work, dies, jigs, and fixtures. High Grade Work.

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WE WANT
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We make a specialty of manufacturing hardware articles complete and ready for the market. We are also well equipped to do high class japanning and tinplating.
Let us figure on your work.

SCHARTOW MANUFACTURING CO.
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We Can Handle Your Machine Work

Put your problems up to us. Our facilities enable us to do High Grade and accurate machine work. Send your blueprints for quotations.

ARBUCKLE & COMPANY, Rushville, Ind.

WORK WANTED
FOR OUR

Machine Shops
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Light Sheet Metal
Press Department
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2 Plants—600 Mechanics

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No matter what work you want done or who's doing your work now, try us the next time.

We are prepared to do a variety of machine and foundry work. Our equipment is excellent. Our price is reasonable; our service is prompt. Details gladly sent.

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Houston Texas

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Capacity now available on seven Jones & Lamson flat turret lathes, 2 x 24 and 3 x 36" for both bar and chuck work. Also other turret and engine lathes.
Send us your Blue Prints for estimates.

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115 Plymouth St. Jersey City, N. J.
Ten Minutes from Lower New York City

Quality and Delivery

Special Machinery from Blue Prints. Skilled Mechanics competent to produce exacting work.

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Machine Parts
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TOOLS, JIGS, FIXTURES, ETC.

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RATES FOR SHORTER RUNS OR OTHER SPACES FURNISHED ON REQUEST.

CUMMINGS MACHINE WORKS

110 HIGH STREET, BOSTON, MASS.

Experimental Machinery

Jig, Tool and Fixture Work
Carbonizing, Hardening and Welding Dept.

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WE design and build Special Machinery. We build Special Machinery to your blue prints. We build Machines and Tools in quantity lots.

THE ATLAS MACHINE COMPANY
Waterbury, Conn.

Special Machinery

built to order, also wood and metal patterns. We have an up-to-date machine and pattern shop and foundry facilities.

All work guaranteed.

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ENGINEERS' and contractors' complete organization and equipment ready to handle general contracts.

Complete engineering organization to furnish estimates and designs.

Will take work on cost plus fixed sum basis only.

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Designers and Builders of all kinds of

SPECIAL AND AUTOMATIC MACHINERY

H. A. Inman Co., Inc.
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BUILT TO ORDER

We have splendid facilities for producing special machinery of all kinds, and are prepared to guarantee satisfaction—both as regards workmanship and price. We have foundry facilities and an up-to-date machine shop. Send us blue prints and give us an opportunity to quote you price. We can save you money.

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Let Our Factory Be Your Factory

for manufacturing your SPECIALS, particularly in the line of SPECIAL MACHINES and PARTS, STEAM, GAS or HOT-WATER DEVICES, VALVES, CARBURETORS, or any product in manufacturing in which brass, iron or steel, cast or rolled, are required. Estimates given from samples or blueprints, preferably both. Twenty years' experience.

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Special Machinery Built and Parts Manufactured

With the high grade facilities that we have, we are in a position to economically make the machines you want. We also can handle medium and heavy planing, boring, turning, and medium milling machine work.

Tell us what you need.

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Williamsport, Pa.

WE are in position to build machinery, machine your parts or furnish your castings.

Hermance Machine Co.
Williamsport, Pa.

Small Special Parts

Prompt Service

All kinds of iron, steel or brass parts ground, machined, nickel-plated or polished to order.

GWYNN ENGR. CO.
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Let Us Build That SPECIAL MACHINERY For You

Let us build it for you, either light or heavy. 15 years' experience
Send us your Blue Prints for estimate
Can also use Lathe, Shaper, Milling Machine
Drill Press and Planer Work
Pattern and Foundry Facilities

STANDARD MACHINE CO.
Cor. 3rd St. and Canal Dayton, Ohio

Special Machinery

TOOLS, JIGS, Etc.

PROMPT SERVICE
AND
QUALITY GUARANTEED
AT
REASONABLE PRICES

Write Us. We Will Please You.

The Rupp Mfg. Co.
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Special Machinery Tool and Die Work

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We are in position to take new contracts for all kinds of machine work, either parts or machines built outright. Special machinery, tool and die work our specialty.

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Assures Good Delivery On
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Tools, Dies, Jigs and Fixtures
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Our modern, well equipped machine shops at your service for building

SPECIAL MACHINERY

Special Internal Combustion Motors

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We Build Complete Machine Tools on Contract

Large machine shop with assembly floor. If you have any machine work or assembling to let out, get in touch with us. Have facilities for producing thousands of miscellaneous machine parts.

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can furnish gray iron castings up to 14,000 lbs. Well equipped machine shop, boring mills up to 8 foot. Prompt delivery. Give us a trial.

GREY IRON CASTINGS
Light and Medium
MACHINE WORK
Fair Haven Foundry & Machine Co.
FAIR HAVEN, VERMONT

Gray Iron Castings

up to two tons

Machine and Handmolding
Contract Work Preferred
Planer and Lathe Work Solicited
Gray Foundry, Inc., Poultney, Vt.

Hand or Machine Moulded

Grey Iron Castings

One ounce to five tons

CHAS. E. DAVIS FDY. CO., Inc.
Rutland, Vermont.

Gray Iron Castings

Can give prompt service and the right price.

F. R. PATCH MFG. CO.
RUTLAND, VT.

First Grade Foundry and Machine Work

CASTINGS

Grey Iron, 1 oz. to 2500 pounds
GARDNER GENERAL F'DRY CO.
Gardner, Mass.

Mansfield Foundry Co.

Grey Iron Castings
Quality and Service
Mansfield **Mass.**

Gray Iron Castings

We are in a position to handle orders in this line. Send us specifications and we will be glad to quote on any work you may have.

N. E. Foundry & Machinery Co.
113 Forest Street, Campello, Mass.

Franklin Machine Company
PROVIDENCE, R. I.

Engineers—Founders—Machinists

Manufacturers of
Grey Iron Castings — Transmission Machinery
Harris-Corliss Engines — Special Machinery of all kinds.

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THE BERBECKER & ROWLAND MFG. CO.
Waterville, Conn.

CASTINGS

Brass, Bronze and Aluminum Castings. Good deliveries. Low prices. We are in a position to make wood and metal patterns for practically any kind of casting work. Let us quote prices.

Turner & Seymour Mfg. Co.
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Grey Iron Castings

Small and Medium

Write for prices and delivery

PORTLAND FOUNDRY CO.
PORTLAND, CONN.

WE are in a position to take on 100 tons per month of Grey Iron Castings.

May we quote you?
THE MANUFACTURERS
IRON FOUNDRY, INC.
Bridgeport, Conn.

"Bridgeport" Brand Non-Ferrous Castings Are
Brass Bronze Aluminum **"RIGHT" CASTINGS** Special Metals for Special Purposes

Machine Work to Specifications

The Monumental Bronze Co.
Foundry Dept. *Bridgeport, Conn.*

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For Automobile, Marine and Stationary Gasoline Engines Are Our Specialty

All materials chemically analyzed and the finished work guaranteed true to pattern and readily machinable. We are equipped to handle work up to 5 tons. Write for full particulars.

The Pequonnock Foundry, Inc., Bridgeport, Conn.

Brass and Bronze
CASTINGS

Founders of
Bearing Bronzes, Gear Bronzes,
Phosphor Bronzes, Plastic Bronzes,
Gun Metal, Manganese, Aluminum

The Connecticut Brass Fdy. Co., Inc.
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E. G. MUNSON. Utica, N. Y.
GREY IRON CASTINGS
PATTERN WORK (Wood & Iron)
MACHINE WORK

The building and mounting of patterns for moulding machines a specialty.

Gray Iron Castings

Our up-to-date foundry in connection with our extensive machine shops puts us in position to do a great variety of high grade work. Our prices are reasonable and orders will be filled promptly.

A. L. SWEET IRON WORKS
Medina, N. Y.

GREY IRON CASTINGS
UP TO ONE TON
Can ship direct on Erie, N. Y. Central or D. L. & W.
Hood Furnace & Supply Co.
Corning, N. Y.

Castings and Machine Work

Grey Iron, Brass and Aluminum Castings, also heavy and light machine work, with a good equipment for both. Reasonable prices and prompt deliveries. First-class workmanship. Write us.

McKim Foundry & Machine Co.
Lockport, N. Y.

GRAY IRON CASTINGS
Sweet & Doyle Foundry & Machine Co.
Green Island Albany Co., N. Y.

GRAY IRON CASTINGS

Large Foundry in Greater New York; ample equipment and shipping facilities; wish to quote contract or special work in quantities. Send drawings or patterns for prices.

RICHEY, BROWNE & DONALD, INC.
2101 Flushing Ave., Maspeth (L. I.), N. Y.

CONTRACT WORK

SPECIAL MACHINERY—MACHINE WORK—PRESS WORK
FOUNDRY WORK—AUTOMATIC SCREW MACHINE WORK

RATES—ONE INCH SPACE $2.25 PER INSERTION ON YEARLY BASIS.
RATES FOR SHORTER RUNS OR OTHER SPACES FURNISHED ON REQUEST.

Iron Ballast and Weights

Manufactured in any size or specification

Iron Trading Corporation
Park Row Bldg. New York

Finished Castings and Stampings

Castings in Iron, Bronze or Brass. Also Stampings. Facilities for machining, fitting, finishing (electroplating, japanning, enameling, etc.) and assembling, enable us to put a product through from *start to finish.*

Send blueprints and specifications for estimate.

TUTTLE & BAILEY MFG. CO.
Vanderbilt Concourse Bldg. New York

SOFT GRAY IRON CASTINGS

Either cored or plain. Ordinary work that can be done by hand workers. Castings up to two hundred and fifty pounds.
Prompt delivery. Send for prices.

WM. M. CRANE COMPANY
16-20 West 32nd Street, New York, N. Y.

PROMPT DELIVERY

Gray Iron Castings
Pattern Work—Machine Work
Grate Bars—Furnace Castings
Blacksmithing

WASHBURN & GRANGER, Inc.
50 CHURCH ST. NEW YORK CITY

CASTINGS

Gray Iron—Light or Heavy
Malleable and Steel
Machine Work
DIE CASTINGS
in white metal alloys

LOUGH BROTHERS
90 West Street NEW YORK

GRAY IRON CASTINGS

Grate Bars preferred. We operate a large foundry, and are in a position to turn out light and medium-weight castings in large quantities. Send us your specifications to estimate.

National Foundry Company of N. Y., Inc.
10-40 Sandford St., Brooklyn, N. Y.

GRAY IRON CASTINGS AND MACHINE SHOP WORK

Can give prompt service and the right price.

GLENS FALLS MACHINE WORKS
GLENS FALLS, N. Y.

IRVING SUBWAY GRATINGS

TO YOUR ORDER

IRVING IRON WORKS CO.
L. I. CITY CITY OF N. Y.

Specialties of Manufacture

Up-to-date Brass Foundry, producing rough and high grade ornamental castings. Modern machine shop automatic screw machine. Accurate and interchangeable work a specialty.

Edward Schroeder Lamp Works
716 Jersey Avenue Jersey City, N. J.

Grey Iron Castings

UP TO 1½ TONS
PROMPT SERVICE
Send blueprints for reasonable prices

Penn Foundry & Manufacturing Co.
READING, PA.

BRASS, BRONZE and COPPER CASTINGS

We are making a specialty of Brass, Bronze and Copper Castings of any composition.
Giving special attention to Government Specifications.
Let us quote on your requirements.
Prompt Service, Reasonable Prices.

FITZ WATER WHEEL COMPANY
Hanover, Pa.

GRATE BARS

Locomotive and Stationary

We can supply your needs

Mahoning Foundry & Machine Co.
Punxsutawney, Penna.

We are equipped to make

Heavy Gray Iron Castings

up to 100 tons in one piece and solicit inquiries for this class of work.

Chambersburg Engineering Co.
Chambersburg, Pa.

GREY IRON CASTINGS

Our Large Foundry (about 42,000 Sq. Ft.) enables us to give you prompt service on

Light and Medium Castings

Let us figure with you.

Sanitary Company of America
Linfield, Pa.

WE SPECIALIZE ON

Small Malleable Castings

Send Samples for Prices

EARLY DELIVERY

Columbia Malleable Castings Co., Inc.
COLUMBIA, PA.

Gray Iron Castings

We are prepared to furnish gray iron castings of any description up to 2500 lbs.

Send us your prints and let us estimate on same.

THE HAWLEY DOWN DRAFT FURNACE CO.
EASTON, PA.

Prompt Deliveries On Your GRAY IRON CASTINGS

We are equipped to furnish promptly your Gray Iron Castings up to 6000 lbs.
Also can handle your Machine Work. Let us quote on your requirements.

S. G. BARKER & SON, Inc.
Scranton Pa.

GREY IRON CASTINGS

Loam, Green Sand or Dry Sand up to 25,000 pounds. Also Pattern and Machine Work. Prompt Deliveries.

FINCH MFG. COMPANY
Scranton, Pa.

GRAY IRON CASTINGS

MACHINE AND FLOOR-MOULDED

LANSDALE FOUNDRY CO.
LANSDALE :: :: :: :: PA.

Colonial Foundry & Machine Co.

York, Pa.

Heavy Grey Iron Castings our Specialty

Prompt deliveries.
Inquiries solicited.

CONTRACT WORK

SPECIAL MACHINERY—MACHINE WORK—PRESS WORK
FOUNDRY WORK—AUTOMATIC SCREW MACHINE WORK

RATES—ONE INCH SPACE $2.25 PER INSERTION ON YEARLY BASIS.
RATES FOR SHORTER RUNS OR OTHER SPACES FURNISHED ON REQUEST.

BRONZE, BRASS AND ALUMINUM
CASTINGS
Right prices—quick deliveries
Lincoln Brass Foundry, Inc.
CHESTER, PA.
(N. Y. Office, No. 105 Fulton St.)

LET us quote you on Gray Iron Castings, also Patterns. We carry Tubber and Circular Grates on stock.

NORTH LEBANON FOUNDRY CO., Inc.
2nd & Canal Sts., Lebanon, Pa.

Gray Iron Castings
Machine and Hand Moulded
Light and heavy work up to 3000 lbs. Pattern and machine work.
Send drawings or samples for prices.

The Samuel J. Creswell Iron Works
23d and Cherry Sts. Philadelphia, Pa.

J. E. WILLIAMSON COMPANY
BELLWOOD, PA.
Can Furnish Gray Iron
CASTINGS
Up to 5000 Pounds Prompt Delivery

The French Creek Foundry Co.
Franklin, Pa.

We have completed additions to our plant and have 10 tons daily capacity available for contract. Castings from 100 to 8000 lbs. preferred.

OUR SPECIALTIES
Grey Iron Castings up to 3000 lbs.

Superior quality, machine or hand moulded, sand blasted, pickled or tumbled. On good tonnage we will make special moulding equipment that will warrant you the best price and most efficient service. Patterns made of wood, brass, aluminum or iron.

Grinding wheel machinery, hack saw machines, sensitive drill presses, drill press vises, wire rod cutters.

NORTH WALES MACHINE CO., Inc., North Wales, Pa.

Grey Iron Castings
We want additional tonnage of Contract Castings, up to 500 lb. pieces. Soft or Hard.
Good Work Prompt Shipments
Starke's Dixie Plow Works, Inc.
Richmond, Va.

The Simpson Foundry Company
Established 1895
Gray Iron Castings
Quality **Newark, Ohio** *Service*

THE FRANCE FOUNDRY & MACHINE CO.
NORTH BALTIMORE, OHIO
Gray Iron and Brass Castings
Capacity Gray Iron Castings 10 ton per day. Modern Machine, Pattern and Forging Shop in connection.
QUALITY SERVICE

Large and Small
Gray Iron Castings Machine Work
Good service assured
Estimates from Blueprint
The Fulton Foundry & Machine Co.
Cleveland, Ohio

Brass, Bronze and Aluminum Castings
Our facilities are such that we can offer quality work at prices that will satisfy. What do you require?
THE IDEAL BRONZE COMPANY
1267 E. 55th St., Cleveland, Ohio

Gray Iron Castings
Well equipped foundry. In position to give good service.
Write us
The Burch Plow Works Co.
Dept. E Crestline, Ohio

The Bay View Foundry Company
Sandusky, Ohio
FOUNDERS OF
Light and Medium Gray Iron Castings

WANTED
Grey Iron Castings
Preferably in weight from one hundred pounds to eight tons. Castings of good quality and prompt delivery guaranteed.
THE BONNOT COMPANY
Canton, Ohio

Machine Work
Splendidly equipped machine shop open for immediate work.

Can place at your disposal:

One 22 in. heavy lathe by 12 ft.
One 24 in. lathe by 10 ft.
One 12 in. lathe by 5 ft.
One 16 in. stroke bulldozer.
One 24 by 24 by 72 planer.
One 18 by 18 by 60 planer.
One heavy double end punch and shear.
Three single end punch presses.
One corrugated sheet curving rolls; handles up to 12 gauge.
One corrugated sheet punch and riveting machine.
One squaring shear, handles 10 gauge x 84" long.
One turret lathe.
Six drill presses 16 by 22 inches.
One light trip hammer.
Miscellaneous small machinery.
One 10 ft. boring mill will be available in thirty days.

Castings
Capacity 25 tons per day. Now open for 10 tons daily.
Work from 5 to 10,000 lbs.
War work preferred.
Specialize on heavy Lathe Bed Castings.

The F. B. Zieg Mfg. Company
Fredericktown, Ohio

Converter Steel
Castings

Our excellent equipment enables us to turn out promptly and at the lowest price anything in Converter Steel Castings up to 2500 pounds.

Our plant consists of a foundry 320x80 feet, machine shop 400x80 feet, and a large pattern shop complete in every detail.

The recent addition of a ten-ton open hearth furnace has augmented our capacity by fully 25 tons. This now gives us a combined capacity of about 35 tons per day on open hearth and converter steel castings.

Efficient service guaranteed on large or small contracts. Send blue prints or samples for estimates.

THE ADAMSON MACHINE CO.
Akron, Ohio

CONTRACT WORK

SPECIAL MACHINERY — MACHINE WORK — PRESS WORK
FOUNDRY WORK — AUTOMATIC SCREW MACHINE WORK

RATES—ONE INCH SPACE $2.25 PER INSERTION ON YEARLY BASIS.
RATES FOR SHORTER RUNS OR OTHER SPACES FURNISHED ON REQUEST.

Finished Castings

Grey Iron
Semi-Steel
Steel
Bronze

Parts Fully Machined Ready to Assemble

Or we will build your machines complete from your prints or patterns.

Deliveries Good
Prices Right

The Chalmers Mfg. Co.
Lima, Ohio

WE are able to take on additional tonnage in gray iron and semi-steel castings. Heavy and light castings our specialty. Let us know your requirements and we will be glad to quote you without obligation.

THE ADVANCE FOUNDRY CO.
Dayton, Ohio.

CASTINGS

SEMI-STEEL GRAY IRON

Light and heavy work up to 20 tons
Capacity 1000 tons per month
Exceptional railway facilities. Prompt deliveries

GREENLEE FOUNDRY CO.
662 W. 12th Street CHICAGO, ILL.

Grey Iron Castings

10 pounds to 5 tons each
Send us your patterns

Prompt Service
Reasonable Prices

Excelsior Tool and Machine Co.
East St. Louis, Illinois

---

26 Acre Factory at Your Command

Owing to the fact that our line is seasonable merchandise we quite often have room for additional work and are, therefore, in position to offer prompt service on

Grey Iron Castings
Machining
Forging
Wood Work

Peoria is the center of population in the United States and affords excellent railroad facilities for both raw and finished materials.

Let us quote on your work.

Acme Harvesting Machine Co.
Incorporated
Established 58 Years
Peoria, Illinois

BRONZE

Castings for bearings.
Send us Blueprints or samples for estimates.

BRASS FOUNDRY COMPANY
700 ADAMS ST. PEORIA, ILL.

GRAY IRON CASTINGS

AND

Machine Shop Work

Can Give Prompt Service
and Good Price

Merrill Iron Works MERRILL WIS.

CASTINGS

Semi-Steel Grey Iron

Unfilled capacity 30 tons per day
Prompt deliveries. Write us

FLOUR CITY O. IRON CO.
MINNEAPOLIS, MINN.

GRAY-IRON and SEMI-STEEL CASTINGS

Advance-Rumely Company
La Porte, Ind. Battle Creek, Mich.

CASTINGS
GREY IRON BRASS
One to 5000 lb. 1 oz. to 100 lb.

Specialties:
Quality and Service
Let us quote you.

Montpelier Manufacturing Company
Montpelier, Ind.

Difficult Castings

We specialize on difficult work that the average foundry can't turn out.
Light Grey Iron Castings.

Red Jacket Mfg. Co.
Davenport Iowa

Grey Iron Castings

BRASS CASTINGS

Mine cars, monitor cars, sand driers, incline rollers, brake shoes, etc., contractors' equipment. Machine work of all kinds.

Harriman Foundry & Machine Works
Harriman, Tenn.

WE specialize on small gray iron castings. Send sample or blue print for prices.

Mascot Stove Manufacturing Co.
Chattanooga, Tenn.

BARCALO-BUFFALO

Drop Forgings, Die Ma'ing, Machining, Polishing, Nickel Plating.

We are equipped to Forge, Machine and Finish parts complete. Large runs efficiently handled.

BARCALO MANUFACTURING CO.
Buffalo, N. Y.

FORGINGS

Gear blanks, rods, shafting.
How you want them.
When you want them.

JOLIET FORGE CO.
JOLIET, ILL.

How To Get Good FORGINGS

Not so difficult. We make all kinds of drop forgings up to 50 lb. and valves and fittings up to 2 inches. Quality and deliveries guaranteed.
Send samples or blueprints.

HENRY VOGT MACHINE CO.
LOUISVILLE, KY.

CONTRACT WORK

SPECIAL MACHINERY — MACHINE WORK — PRESS WORK
FOUNDRY WORK — AUTOMATIC SCREW MACHINE WORK

RATES—ONE INCH SPACE $2.25 PER INSERTION ON YEARLY BASIS.
RATES FOR SHORTER RUNS OR OTHER SPACES FURNISHED ON REQUEST.

Wood Patterns and Models

Send us your drawings for estimate

S. H. Barnum, New Haven, Conn.

WOOD PATTERNS

WANTED
PATTERN WORK

The Straight Line Engine Co.
Syracuse, N. Y.

PATTERNS, WOOD AND METAL

Let us quote on your future pattern requirements. We can handle anything. Good deliveries and satisfaction guaranteed. If it is a pattern job we can handle it.
Marine Work a Specialty

STANDARD PATTERN WORKS
North George St. and Hamilton Ave., York, Pa.

KEYSTONE PATTERN WORKS

148 So. 18th St.
PITTSBURGH

PATTERNS

Wood, brass or aluminum patterns.
Also Tools, Jigs and Fixtures

THE S-P MFG. CO.
872 East 72d Street
CLEVELAND, OHIO

PATTERNS—Wood and Metal.
CASTINGS — Brass, Bronze and Aluminum.
MACHINE WORK — General, medium and light work.
PLATING — Nickel, Copper, Brass and Silver.

We do the job *right* and *on time*.

WESTERN FOUNDRY & MACHINE CO.
Moline, Illinois

PATTERNS

Wood, brass or aluminum patterns.
Accurate work, prompt delivery.

Marion Malleable Iron Works
Dept. P. S. Marion, Indiana

FABRICATION of Sheet Metal, Light Plate and Structural Steel—No. 26 gauge to ⅛ inch, Black or Galvanized. Stacks, Tanks, Hoppers, Pipe, Breechings and Specialties.
Your inquiries solicited.

York Heating and Ventilating Co.
Manufacturing Department
York, Pa.

STEEL PLATE WORK

Three-sixteenth inch to ½ inch thickness Knocked Down or Riveted.

HAMBURG STEEL TANK WORKS
Hamburg, Berks Co., Penna.

Steel Tanks, Stacks, Etc.

We fabricate materials for steel tanks and stacks of all kinds and sizes or any special work requiring sheet steel 3/16" or lighter down to No. 16 gauge. First-class workmanship.

JOS. F. WANGLER BOILER & SHEET IRON WORKS CO.
St. Louis, Mo.

WORK SOLICITED FOR BULLDOZERS, PUNCHES BRADLEY HAMMERS EYE BENDERS, HEADERS ETC.

RACINE SATTLEY FACTORIES
Springfield Illinois

CASE HARDENING—
TEMPERING
HEAT TREATMENT

Send us your inquiries

WIEDEMANN MACHINE CO.
1816 Sedgley Ave., Philadelphia

ELECTRO LEAD PLATING

Our process will give you an absolutely pure, smooth coat of lead—rust-proof and able to withstand acid and fumes. We do your work or license responsible companies to use the process.
Your inquiries will receive prompt attention. Send samples for free treatment.

THE U. S. ELECTRO LEAD PLATING CO.
CLEVELAND, OHIO

General Machine and Plate Shop

is finishing up a government contract and

Wants More Government Work

Gillespie Mfg. Corp.
Jersey City, N. J.

BEYOND A DOUBT

Serious business losses are often prevented by actively anticipating a crisis, such as a threatened lack of orders needed to keep a metal-working shop busy.

Regular use of small space in this section will provide you with effective, modern weapons for defense, which are as necessary nowadays to business as the rifle and hand grenade to the soldier in the trenches.

The Contract Work Section

THE IRON AGE
239 West 39th Street
New York City

BUYERS INDEX

The firms listed here are also represented with an advertisement in this issue. See the ads for further information.

ABRASIVE WHEELS
See Grinding Wheels

ABRASIVES
Harrison Supply Co., Boston, Mass.

ACCUMULATORS
Elmes, Chas. F., Eng. Wks., Chicago, Ill.
Garrison, A., Foundry Co., Pittsburgh, Pa.
Metalwood Mfg. Co., Detroit, Mich.
Morgan Engineering Co., Alliance, O.
Southwark Fdry. & Mch. Co., Philadelphia, Pa.
Watson-Stillman Co., Alliance, O.
Worthington Pump & Machinery Corp., 115 Broadway, N. Y. C.

ACID EGGS
Valley Iron Works, Williamsport, Pa.

ADAMITE WHEELS
See Grinding Wheels

AIR TANKS AND CYLINDERS
Air-Tight Steel Tank Co., Pittsburgh, Pa.
Janney, Steinmetz & Co., Philadelphia, Pa.
National Tube Co., Pittsburgh, Pa.
Petroleum Iron Works Co., Sharon, Pa.
Pressed Steel Tank Co., Milwaukee, Wis.
Scaife, William B., & Sons Co., Pittsburgh, Pa.

ALLOYS
Alumino-Vanadium
American Vanadium Co., Pittsburgh, Pa.
Primos Chemical Co., Primos, Pa.
Aluminum
United Smelting & Aluminum Co., New Haven, Ct.
Boronic-Copper for Gold & Silver (Shot)
American Boron Products Company, Reading, Pa.
Cupro-Vanadium
American Vanadium Co., Pittsburgh, Pa.
Primos Chemical Co., Primos, Pa.
Titanium
Titanium Alloy Mfg. Co., Niagara Falls, N. Y.
Uranium
Standard Alloys Co., Pittsburgh, Pa.
Vanadium
American Vanadium Co., Pittsburgh, Pa.
Metal & Thermit Corp., 120 B'way, N. Y. City
Primos Chemical Co., Primos, Pa.

ALUMINUM
Aluminum Company of America, Pittsburgh.
Erdle Perforating Co., Rochester, N. Y.
Janney, Steinmetz & Co., Phila., Pa.
Peninsular Smelting Co., Detroit, Mich.
Syracuse Smelting Works, Brooklyn, N. Y.
U. S. Reduction Co., East Chicago, Ind.
United Smelting & Aluminum Co., New Haven, Conn.
Boronic-Alloying (Shot)
American Boron Products Company, Reading, Pa.
Granulated
United Smelting & Aluminum Co., New Haven, Conn.
Ingots, Sheets, Rods
United Smelting & Aluminum Co., New Haven, Ct.

AMMONIA RECOVERY PLANTS
Koppers, H., Co., Philadelphia, Pa.

ANGLES, CHANNELS AND TEES
Interstate Iron & Steel Co., Chicago, Ill.

ANNEALING
Bidle, W. S., Company, Cleveland, O.
Chicago Metal Treating Co., Chicago, Ill.

ANNEALING BOXES
Pittsburgh Annealing Box Co., N. S., Pittsburgh, Pa.
Warren City Tank & Boiler Works, Warren, O.

ANTI-FRICTION METALS
See Babbitt Metal

ANTIMONY
Syracuse Smelting Works, Brooklyn, N. Y.
United Smelting & Aluminum Co., New Haven, Conn.

ANVILS
Eagle Anvil Works, Trenton, N. J.
Potts, Horace T., & Co., Philadelphia, Pa.

APPRAISERS
Fletcher-Thompson, Inc., Bridgeport, Conn.

ARBORS
Detroit Twist Drill Co., Detroit, Mich.

ARCHITECTS
Mill
Fletcher-Thompson, Inc., Bridgeport, Conn.

ARRESTERS
Spark
Harrington & King Perforating Co., Chicago.

AXLES
Car and Locomotive
American Steel Export Co., Woolworth Bldg., New York City.
Camden Forge Co., Camden, N. J.
Carnegie Steel Co., Pittsburgh, Pa.
Donner Steel Company, Buffalo, New York.
Illinois Steel Co., Chicago, Ill.
Midvale Steel & Ordnance Co., Philadelphia, Pa.
Pittsburgh Forge & Iron Co., Pittsburgh, Pa.
Standard Steel Wks. Co., Philadelphia, Pa.

BABBITT METAL
Ajax Metal Co. Philadelphia, Pa.
Allan, A., & Son, Harrison, N. J.
Damascus Bronze Co., Pittsburgh, Pa.
Keystone Bronze Co., Pittsburgh, Pa.
Syracuse Smelting Works, Brooklyn, N. Y.
United Smelting & Aluminum Co., New Haven, Conn.
U. S. Reduction Co., East Chicago, Ind.

BALL FLOATS
Naugatuck Mfg. Co., Naugatuck, Conn.

BALLAST
Ship
Iron Trading Corporation, 15 Park Row, N. Y City.

BALLS
Steel, Brass and Bronze
Auburn Ball Bearing Co., Rochester, N. Y.
New Departure Mfg. Co., Bristol, Conn.

BANDS
Steel
Akron-Selle Co., Akron, O.

BARGES
Steel
American Bridge Co., 30 Church St., N. Y. C

BARRELS
Iron and Steel
Scaife, William B., & Sons Co., Pittsburgh, Pa.
Pressed Steel
Pressed Steel Tank Co., Milwaukee, Wis.
Sand-Blast
Hoevel Mfg. Corp., 44 Church St., N. Y. C.
Pangborn Corporation, Hagerstown, Md.
Shop
Clark, W. J., Co., Salem, O.
Cleveland Wire Spring Co., Cleveland, O.
Truck
Cleveland Wire Spring Co., Cleveland, O.

BARS
Concrete
American Steel & Wire Co., Chicago, Ill.
Grant, Robert, Woolworth Bldg., N. Y. City.
Inland Steel Co., Chicago, Ill.
Interstate Iron & Steel Co., Chicago, Ill.
Laclede Steel Co., St. Louis, Mo.
Lindsay, James C., & Co., Philadelphia, Pa.
Pardee, C., Wks., Perth Amboy, N. J.
Republic Structural Iron Works Co., Cleveland, O.
Galvanized
Penn Steel & Iron Corp., Lancaster, Pa.
Iron and Steel
Bethlehem Steel Co., South Bethlehem, Pa.
Brown-Wales Co., Boston, Mass.
Burden Iron Co., Troy, N. Y.
Camden Forge Co., Camden, N. J.
Cann & Saul, 516 Commerce St., Phila., Pa.
Carnegie Steel Co., Pittsburgh, Pa.
Central Steel Co., Massillon, O.
De Coi, Richard, Company, Philadelphia, Pa.
Donner Steel Company, Buffalo, New York.
Eastern Export Co., 30 Church St., N. Y. C.
Grant, Robert, Woolworth Bldg., N. Y. City.
Gulf States Steel Co., Birmingham, Ala.
Hess Steel Corporation, Baltimore, Md.
Hirsch Rolling Mill Company, St. Louis, Mo.
Illinois Steel Co., Chicago, Ill.
Inland Steel Co., Chicago, Ill.
Interstate Iron & Steel Co., Chicago, Ill.
Lackawanna Steel Co., 2 Rector St., N. Y.
Laclede Steel Co., St. Louis, Mo.
Latshaw Steel & Metal Products Corp., 220 Broadway, N. Y. City.
Lindsay, James G., & Co., Philadelphia, Pa.
Midvale Steel & Ordnance Co., Philadelphia, Pa.
Milton Mfg. Co., Milton, Pa.
Monongahela Iron & Steel Co., Pittsburgh, Pa.
Mudge, E. W., & Co., Pittsburgh, Pa.
Nicetown Plate Washer Co., Philadelphia, Pa.
Pardee, C., Works, Perth Amboy, N. J.
Pigott, Thomas E., Cleveland, O.
Republic Iron & Steel Co., Youngstown, O.
Simonds Mfg. Co., Lockport, N. Y.
Tioga Steel & Iron Co., Philadelphia, Pa.
Trumbull Steel Co., Warren, O.
Low Phosphorus Melting
Vulcan Iron & Steel Co., Pittsburgh, Pa.
Refined Iron
Penn Steel & Iron Corp., Lancaster, Pa.

BEAMS, CHANNELS AND ANGLES
American Steel Export Co., Woolworth Bldg., New York City.
Baily & Allen Co., Chicago, Ill.
Belmont Iron Works, Philadelphia, Pa.
Brown-Wales Co., Boston, Mass.
Carnegie Steel Co., Pittsburgh, Pa.
De Coi, Richard, Company, Philadelphia, Pa.
Donner Steel Company, Buffalo, New York.
Grant, Robert, Woolworth Bldg., New York City.
Illinois Steel Co., Chicago, Ill.
Inland Steel Co., Chicago, Ill.
Jones & Laughlin Steel Co., Pittsburgh, Pa.
Lackawanna Bridge Co., 2 Rector St., N. Y.
Lackawanna Steel Co., 2 Rector St., N. Y.
Phoenix Iron Co., Philadelphia, Pa.
Scully Steel & Iron Co., Chicago, Ill.
Shippers' Car Line, 165 Broadway, N. Y.
Worden-Allen Co., Milwaukee, Wis.

BEARINGS
Babbitt
American Roller Bearing Co., Pittsburgh, Pa.
Stewart Mfg. Co., Chicago, Ill.
Ball
Auburn Ball Bearing Co., Rochester, N. Y.
Fafnir Bearing Co., New Britain, Ct.
Federal Bearings Co., Inc., Poughkeepsie, N. Y.
Gurney Ball Bearing Co., Jamestown, N. Y.
Gwilliam Co., 253 W. 58th St., N. Y.
Hoover Steel Ball Co., Ann Arbor, Mich.
Indiana Die Casting Co., Indianapolis, Ind.
New Departure Mfg. Co., Bristol, Ct.
Norma Co. of America, 1790 Broadway, N. Y. C.
Pruyn Ball Bearing Works, Philadelphia, Pa.
"S K F" Ball Bearing Co., Hartford, Ct.
Brass and Bronze
American Bronze Corp., Berwyn, Pa.
Bunting Brass & Bronze Co., Toledo, O.
Columbus Brass Company, Columbus, O.
Johnson Bronze Co., New Castle, Pa.
Lumen Bearing Co., Buffalo, N. Y.
Wellman Bronze Co., Cleveland, O.
Combination
Norma Co. of America, 1790 Broadway, N. Y.
Die Cast
Barnhart Bros. & Spindler, Chicago, Ill.
Lumen Bearing Co., Buffalo, N. Y.
Oilless
Metalline Company, Long Island City, N. Y.
Radial
"S K F" Ball Bearing Co., Hartford, Ct.
Roller
Federal Bearings Co., Inc., Poughkeepsie, N. Y.
Gwilliam Co., 253 W. 58th St., N. Y.
Hyatt Roller Bearing Company, Newark, N. J.
Norma Co. of America, 1790 B'way, N. Y. C.
Timken Roller Bearing Co., Canton, O.
Shaft Hanger
Fafnir Bearing Co., New Britain, Ct.
Thrust
Fafnir Bearing Co., New Britain, Ct.
Gwilliam Co., 253 W. 58th St., N. Y.
Norma Co. of America, 1790 Broadway, New York City.
Pruyn Ball Bearing Works, Philadelphia, Pa.
"S K F" Ball Bearing Co., Hartford, Ct.

BELT DRESSING
Chicago Belting Co., Chicago, Ill.
Crescent Belt Fastener Co., 381 Fourth Ave., N. Y.
Desmond-Stephan Mfg. Co., Urbana, O.
Dixon, Jos., Crucible Co., Jersey City, N. J.
Graton & Knight Mfg. Co., Worcester, Mass.
Ladew, E. R., Co., Inc., 137 Centre St., N. Y. C.
Schieren, Chas. A., Co., 37 Ferry St., N. Y.
Smith, Werner G., Co., Cleveland, O.

BELT FASTENERS
Bristol Co., Waterbury, Ct.
Chicago Belting Co., Chicago, Ill.
Crescent Belt Fastener Co., 381 Fourth Ave., N. Y.

BELT HOOKS
Ladew, Edward R., Co., Inc., 137 Centre St., New York.

BELT TIGHTENER
Hoggson & Pettis Mfg. Co., New Haven, Ct.

BELTING
Chain
Link-Belt Co., Chicago, Ill.
Fabric
Stanley Belting Corp., Chicago, Ill.
Leather
Bond Fdry. & Mach. Co., Manheim, Pa.
Chicago Belting Co., Chicago, Ill.
Chicago Rawhide Mfg. Co., Worcester, Mass
Graton & Knight Mfg. Co., Worcester, Mass.
Ladew, Edward R., Co., Inc., 137 Centre St., N. Y. C.
Schieren, Chas. A., Co., 37 Ferry St., N. Y.
Strong, Homer, Rochester, N. Y.
Teuscher & Son Machinery Supply Company, St. Louis, Mo
Leather Link
Ladew, Edward R., Co., Inc., 137 Centre St., N. Y. C.
Rubber
Goodrich, B. F., Co., Akron, O.
New York Belting & Packing Co., 91-93 Chambers St., N. Y.
Robins Conveying Belt Co., Passaic, N. J.

BENCH PRAWERS
New Britain Mch. Co., New Britain, Ct.

BENCH LEGS
Pressed Steel
New Britain Mch. Co., New Britain, Ct.

BENCHES
Molders
Western Tool & Mfg. Co., Springfield, O.
Saw
Kidder, R. E., Co., Worcester, Mass.
Shop
Western Tool & Mfg. Co., Springfield, O.

BENDING AND STRAIGHTENING MACHINES
Rail
Hilles & Jones Co., Wilmington, Del.

BENDING MACHINES
Hand and Power
American Pipe Bending Machine Co., Boston, Mass.
Beatty Machine & Mfg. Co., Hammond, Ind.
Cleveland Punch & Shear Works Co., Cleveland, O.
Dreis & Krump Mfg. Co., Chicago, Ill.

BENZOL RECOVERY PLANTS
Hinman, D. A., & Co., Sandwich, Ill.
Koppers, H., Co., Pittsburgh, Pa.

BILLETS
Electric Steel
Hess Steel Corporation, Baltimore, Md.
Illinois Steel Co., Chicago, Ill.
Nickel Steel
Andrews Steel Company, Newport, Ky.
Illinois Steel Co., Chicago, Ill.
Steel
American Steel Export Co., Woolworth Bldg., New York City.
Carnegie Steel Co., Pittsburgh, Pa.
Central Steel Co., Massillon, O.
Grant, Robert, Woolworth Bldg., New York City.
Gulf States Steel Co., Birmingham, Ala.
Heyward, Thomas R., Co., Pittsburgh, Pa.
Illinois Steel Co., Chicago, Ill.
Inland Steel Co., Chicago, Ill.
Interstate Iron & Steel Co., Chicago, Ill.
Midvale Steel & Ordnance Co., Philadelphia, Pa.
Mudge, E. W., & Co., Pittsburgh, Pa.
Tenn. Coal, Iron & R. R. Co., Birmingham, Ala.
Ward's, Edgar T., Sons Co., Boston, Mass.
Whitaker-Glessner Co., Wheeling, W. Va.
Wood, Alan, Iron & Steel Co., Phila., Pa.
Youngstown Sheet & Tube Co., Youngstown, O.

BLACK PLATE
Canton Sheet Steel Co., Canton, O.
Seneca Iron & Steel Co., Buffalo, N. Y.

BLANKS
Gear and Pinion
Akron-Selle Co., Akron, O.
Crucible Steel Forge Co., Cleveland, O.
Joliet Forge Co., Joliet, Ill.
National Forge & Tool Co., Irvine, Pa.

BLOCKS
Chain
Abell-Howe Co., Chicago, Ill.
Diamond Chain & Mfg. Co., Indianapolis, Ind.
Ford Chain Block & Mfg. Co., Phila., Pa.
Wright Mfg. Co., Lisbon, O.
Yale & Towne Co., 9 East 40th St., N. Y.
Tackle
Broderick & Bascom Rope Co., St. Louis, Mo.

BLOWERS
American Blower Co., Detroit, Mich.
Buffalo Forge Co., Buffalo, N. Y.
Canedy-Otto Mfg. Co., Chicago Heights, Ill.
Champion Blower & Forge Co., Lancaster, Pa.
Clarage Fan Co., Kalamazoo, Mich.
Clifton-Pratt Company, Cincinnati, O.
Eynon-Evans Mfg. Co., Philadelphia, Pa.
General Electric Company, Schenectady, N. Y.
Gilbert & Barker Mfg. Co., Springfield, Mass.
Harris Bros. Co., Chicago, Ill.
Southwark Fdry. & Mch. Co., Philadelphia, Pa.
Spencer Turbine Cleaner Co., Hartford, Ct.
Sterling Blower Co., Hartford, Ct.

BLUE PRINT MACHINES
Wickes Brothers, Saginaw, Mich.

BOILER COMPOUND
Dearborn Chemical Co., Chicago, Ill.

BOILER GRAPHITE
See Graphite

BOILER HEADS
Flanged and Dished
Lukens Steel Co., Coatesville, Pa.

BOILER MAKERS' SUPPLIES
Cleveland Punch & Shear Works Co., Cleveland, O.
Scully Steel & Iron Co., Chicago, Ill.

BOILER PLATES
See Plates

BOILER SETTINGS
Clinton Metallic Paint Co., Clinton, N. Y.

BOILER SHELLS
Welded
Scaife, Wm. B., & Sons Co., Pittsburgh, Pa.
Wood, John, Mfg. Co., Conshohocken, Pa.

BOILER SHOP TOOLS
Cleveland Punch & Shear Works Co., Cleveland, O.
Covington Mach. Co., Covington, Va.
Wickes Brothers, Saginaw, Mich.

BOILERS
Return Tubular
Erie City Iron Works, Erie, Pa.
Frost Mfg. Co., Chicago, Ill.
Power Machinery Exchange, Inc., 1 Montgomery St., Jersey City, N. J.
Uniflow Boiler Co., Philadelphia, Pa.
Second-hand
Bunton & Bocklus, Pittsburgh, Pa.
Coleman, M. P., Boston, Mass.
Davis, J. F., Chicago, Ill.
General Equipment Company, 30 Church Street, New York City.
Harris Bros. Co., Chicago, Ill.
MacGovern & Co., Inc., 114 Liberty St., N. Y.
Machinery Utilities Co., Inc., 501 Fifth Ave., New York City.
Potts, Henry, & Co., Philadelphia, Pa.
Sterling Iron & Steel Company, Philadelphia, Pa.
Wilson, H. R., Machinery Co., St. Louis, Mo.
Waste Heat
Uniflow Boiler Co., Philadelphia, Pa.
Wickes Boiler Co., Saginaw, Mich.
Water Tube
Babcock & Wilcox Co., 85 Liberty St., N. Y.
Erie City Iron Works, Erie, Pa.
Farrer & Trefts, Inc., Buffalo, N. Y.
Houston, Stanwood & Gamble Co., Cincinnati, O.
Keeler, E., Co., Williamsport, Pa.
Tudor Boiler Mfg. Co., Cincinnati, O.
Wickes Boiler Co., Saginaw, Mich.

BOLT AND NUT MACHINERY
Acme Machinery Co., Cleveland, O.
Howard Iron Works, Buffalo, N. Y.
Landis Machine Co., Waynesboro, Pa.
Manville, E. J., Mach. Co., Waterbury, Ct.
National Machinery Co., Tiffin, O.
Webster & Perks Tool Co., Springfield, O.

BOLT AND RIVET CLIPPERS
Porter, H. K., Everett, Mass.

BOLTS AND NUTS
American Equipment Co., Norristown, Pa.
American Screw Co., Providence, R. I.
American Steel Export Co., Woolworth Bldg., New York City.
Brown Bag Filling Machine Co., Fitchburg, Mass.
Cincinnati Screw Co., Twightwee, O.
Clark Bros. Bolt Co., Milldale, Ct.
Drake Lock-Nut Co., San Francisco, Cal.
Frank, Henry, Jr., 372 Hudson Street, New York City.
Grant, Robert, Woolworth Bldg., New York City.
Hoffman, R. C., & Co., Baltimore, Md.
Hubbard & Co., Pittsburgh, Pa.
Larkin, J. K., & Co., 34 Reade St., N. Y. C.
Michigan Bolt & Nut Works, Detroit, Mich.
Milton Mfg. Co., Milton, Pa.
National Bolt & Nut Co., Pittsburgh, Pa.
National Lock Co., Rockford, Ill.
National Screw & Tack Co., Cleveland, O.
Oliver Iron & Steel Co., Pittsburgh, Pa.
Pittsburgh Forge & Iron Co., Pittsburgh, Pa.
Republic Iron & Steel Co., Youngstown, O.
Rhode Island Tool Co., Providence, R. I.
Rockford Bolt Co., Rockford, Ill.
Russell, Bursdall & Ward Bolt & Nut Co., Port Chester, N. Y.
St. Louis Screw Co., St. Louis, Mo.
Toledo Screw Products Co., Toledo, O.

BOLTS
Expansion
Church, Isaac, South Norwalk, Ct.
Diamond Expansion Bolt Co., 90 West St., N. Y.
Evans, F. H., 31 Hewes St., Brooklyn, N. Y.
Star Expansion Bolt Co., 147 Cedar St., N. Y.
Hanger
National Screw & Tack Co., Cleveland, O.
Rim
National Screw & Tack Co., Cleveland, O.
Stone
National Screw & Tack Co., Cleveland, O.
Tire
National Screw & Tack Co., Cleveland, O.
Toggle
Star expansion Bolt Co., 147 Cedar St., N. Y.
Wheel
National Screw & Tack Co., The, Cleveland, O.

BOOKS
Technical
U. P. C. Book Company, 239 West 39th Street, N. Y. C.

BORING AND DRILLING MACHINES
Horizontal
Detrick & Harvey Mach. Co., Baltimore, Md.
McCabe, J. J., Lathe & Machinery Corporation, 149 Broadway, N. Y.
Morton Mfg. Co., Muskegon, Mich.
Newton Machine Tool Works, Philadelphia, Pa.
Niles-Bement-Pond Co., 111 Broadway, N. Y. C.
Universal Boring Mach. Co., Hudson, Mass.

BORING AND TURNING MACHINES
Vertical
Amalgamated Machinery Corporation, Chicago, Ill.
Bullard Mach. Tool Co., Bridgeport, Ct.
Cincinnati Planer Co., Cincinnati, O.
Colburn Machine Tool Co., Franklin, Pa.
McCabe, J. J., Lathe & Machinery Corporation, 149 Broadway, N. Y.
Niles-Bement-Pond Co., 111 Broadway, N. Y. C.

BORING BARS
Underwood, H. B., & Co., Philadelphia, Pa.

BORING HEADS
Marvin & Casler Co., Canastota, N. Y.

BORING, DRILLING AND MILLING MACHINES
Horizontal
Detrick & Harvey Mach. Co., Baltimore, Md.
Hill, Clarke & Co. of Chicago, Chicago, Ill.
Landis Tool Co., Waynesboro, Pa.
Lucas Machine Tool Co., Cleveland, O.
Morton Mfg. Co., Muskegon, Mich.
Newton Machine Tool Works, Philadelphia, Pa.
Niles-Bement-Pond Co., 111 Broadway, N. Y. C.
Pawling & Harnischfeger Co., Milwaukee, Wis.

BORING MACHINES
Car Wheel
Manning, Maxwell & Moore, 119 W. 40th St., N. Y.
Niles-Bement-Pond Co., 111 Broadway, N. Y. C.
Cylinder
Moline Tool Company, Moline, Ill.

BOX STRAPPING AND FASTENERS
Acme Steel Goods Co., Chicago, Ill.
Cary Mfg. Co., Manhattan Bridge Plaza, Brooklyn, N. Y.
Dehaven Mfg. Co., 50 Columbia Heights, Brooklyn, N. Y.
Stanley Works, New Britain, Ct.

BOXES
Case Hardening
Burnside Steel Co., Chicago, Ill.
Crucible Steel Casting Co., Cleveland, O.
Journal
Gurney Ball Bearing Co., Jamestown, N. Y.
Steel
Cleveland Wire Spring Co., Cleveland, O.
Cornwall Mfg. Co., Cleveland, O.
International Metal Mfg. Co., Wayne Junction, Philadelphia, Pa.

BRAKES
Electric
Electric Controller & Mfg. Co., Cleveland, O.
Power
Loy & Nawrath Co., Newark, N. J.
Steel
Dreis & Krump Mfg. Co., Chicago, Ill.

BRASS MANUFACTURERS
Bridgeport Brass Company, Bridgeport, Ct.
Bristol Brass Co., Bristol, Conn.
Connecticut Brass & Mfg. Corporation, Waterbury, Ct.
Eastern Brass & Ingot Corp., Waterbury, Ct.
Scovill Mfg. Co., Waterbury, Ct.
Somers Company, Inc., Waterbury, Ct.
Brass Melting
Detroit Electric Furnace Co., Detroit, Mich.

BRASS SPECIALTIES
American Brass Forging Co., 168 So. Boulevard, New York City.
American Brass Products Co., Pottstown, Pa.
Bates, W. E., Mfg. Works, Waterbury, Ct.
Bristol Brass Co., Bristol, Conn.
Connecticut Brass & Mfg. Corporation, Waterbury, Ct.
Lunkenheimer Co., Cincinnati, O.
Matthews Mfg. Co., Worcester, Mass.
Scovill Mfg. Co., Waterbury, Ct.
Spindler & Deringer, Jersey City, N. J.
Stimpson, Edwin B., Company, 70 Franklin Ave., Brooklyn, N. Y.

BRICK
Fire
American Enameled Brick & Tile Co., 52 Vanderbilt Ave., New York City.
American Refractories Company, Chicago, Ill.
Ashland Fire Brick Co., Ashland, Ky.
Bellevue Industrial Furnace Company, Detroit, Mich.
Cameron Clay Products Co., Emporium, Pa.
Eureka Fire Brick Wks., Braddock, Pa.
Harbison-Walker Refractories Co., Pittsburgh, Pa.
Hydraulic Pressed Brick Co., St. Louis, Mo.
Pyro Clay Products Co., Oak Hill, O.
Smith, Werner G., Co., Cleveland, O.
Wagner Fire Brick Co., Scranton, Pa.
Heat Insulating
Armstrong Cork & Insulation Co., Pittsburgh, Pa.
Magnesia
Harbison-Walker Refractories Co., Pittsburgh, Pa.

BRIDGE BUILDERS
American Bridge Company, 30 Church St., N. Y. C.
Berlin Construction Co., Berlin, Ct.
Kenwood Bridge Co., Chicago, Ill.
McClintic-Marshall Co., Pittsburgh, Pa.
Pittsburg-Des Moines Steel Co., Pittsburgh, Pa.
Scaife, Wm. B., & Sons Co., Pittsburgh, Pa.
Shoemaker, Lewis F., & Co., Pottstown, Pa.

BRINELL MACHINES
Holz, Herman A., 1 Madison Ave., N. Y. C.

BRIQUETTING
Brass
Eastern Brass & Ingot Corp., Waterbury, Ct.
General Briquetting Co., 41 Broad St., N. Y. C.
Metal Block Corp., Chicago, Ill.

BROACHES
Lapointe, J. N., Co., New London, Ct.

BROACHING MACHINES
Lapointe, J. N., Co., New London, Ct.

BRONZE
Aluminum
Wellman Bronze Co., Cleveland, O.
Manganese
Ajax Metal Co., Philadelphia, Pa.
Bridgeport Brass Company, Bridgeport, Ct.
Lumen Bearing Co., Buffalo, N. Y.
Wellman Bronze Co., Cleveland, O.

BRUSHES
Dynamo and Motor
Dixon, Jos., Crucible Co., Jersey City, N. J.
Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa.
Fibre
Herold Bros. Co., Cleveland, O.
Foundry, Factory and Machine
Herold Bros. Co., Cleveland, O.
Plates
Herold Bros. Co., Cleveland, O.

BUCKETS
Clam Shell
Blaw-Knox Co., Pittsburgh, Pa.
Haiss, Geo., Mfg. Co., 142d St. & Canal Pl., N. Y. C.
Hayward Co., 50 Church St., N. Y. C.
Lakewood Eng. Co., Cleveland, O.
Owen Bucket Co., Cleveland, O.
Williams, G. H., Company, Erie, Pa.
Electric Motor
Hayward Co., 50 Church St., N. Y. C.
Grab
Abell-Howe Co., Chicago, Ill.
Brown Hoisting Machry. Co., Cleveland, O.
Browning Co., Cleveland, O.
Hayward Co., 50 Church St., N. Y. C.
Industrial Works, Bay City, Mich.
Link-Belt Co., Chicago, Ill.
Milwaukee Elec. Crane & Mfg. Co., Milwaukee, Wis.

Orton & Steinbrenner Co., Chicago, Ill.
Wellman-Seaver-Morgan Co., Cleveland, O.
Williams, G. H., Company, Erie, Pa.

Orange Peel

Hayward Co., 50 Church Street, New York City.

BUCKLES

Bale Tie

Joliet Wrought Washer Co., Joliet, Ill.

BUILDINGS

Factory

Aberthaw Construction Company, Boston, Mass.
Austin, The, Co., Cleveland, O.

BULLDOZERS

Williams, White & Co., Moline, Ill.

BURNERS

Gas

Johnson Gas Appliance Co., Cedar Rapids, Ia.

Oil

Best, W. N., Inc., 11 Broadway, N. Y.
Economy Furnace Co., Chicopee, Mass.
Gilbert & Barker Mfg. Co., Springfield, Mass.

Powdered Coal

Locomotive Pulverized Fuel Co., 30 Church St., N. Y. C.

BURRS

Steel

Wrought Washer Mfg. Co., Milwaukee, Wis.

BUSHINGS

Brass and Bronze

American Bronze Corp., Berwyn, Pa.
Brown Engineering Co., Reading, Pa.
Bunting Brass & Bronze Co., Toledo, O.
Johnson Bronze Co., New Castle, Pa.
Morgan Engineering Co., Alliance, O.
Sterling Specialty Company, Newcomerstown, Ohio.
Wellman Bronze Co., Cleveland, O.

Phosphor Bronze

Phosphor-Bronze Smelting Co., Philadelphia.
Seymour Mfg. Co., Seymour, Ct.

BY-PRODUCTS COKE AND GAS OVENS

Koppers, H., Co., Pittsburgh, Pa.

CABLE

Auto Towing

American Steel & Wire Co., Chicago, Ill.

Electric

American Steel & Wire Co., Chicago, Ill.
Hazard Mfg. Co., Wilkes-Barre, Pa.
Roebling's, J. A., Sons Co., Trenton, N. J.

Ignition

American Steel & Wire Co., Chicago, Ill.
Roebling's, John A., Sons Co., Trenton, N. J.

Suspension Bridge

Macomber & Whyte Rope Co., Kenosha, Wis.
Roebling's, John A., Sons Co., Trenton, N. J.

CABLEWAYS AND TRAMWAYS

See Tramways

CALCIUM CARBIDE

Fairbanks, Morse & Company, 30 Church St., N. Y. C.

CALIPERS

Micrometer

Parker, Chas. S., 83 Maiden Lane, New York City.
Starrett, L. S., Co., Athol, Mass.

CALORIMETERS

Gas Recording

Smith Gas Engineering Co., Dayton, O.
Taylor Instrument Companies, Rochester, N. Y.

CANS

Oil

Ansonia Novelty Co., Ansonia, Conn.

CARBONIZING

Chicago Metal Treating Co., Chicago, Ill.

CARBORUNDUM

See Grinding Wheels

CAR DUMPERS

Wellman-Seaver-Morgan Co., Cleveland, O.

CARS

Charging

Lindsay, W. W., & Co., Inc., Philadelphia, Pa.

Dump

Atlas Car & Mfg. Co., Cleveland, O.
Easton Car Construction Co., Easton, Pa.
International Clay Machinery Co., Dayton, O.
Koppel, Orenstein-Arthur Co., Pittsburgh, Pa.
Lakewood Eng. Co., Cleveland, O.

Industrial and Mining

American Steel Export Co., Woolworth Bldg., New York City.
Atlas Car & Mfg. Co., Cleveland, O.
Chase Foundry & Mfg. Co., Columbus, O.
Easton Car & Construction Co., Easton, Pa.
Grant, Robert, Woolworth Bldg., N. Y. C.
Koppel, Orenstein-Arthur Co., Pittsburgh, Pa.
Lakewood Eng. Co., Cleveland, O.
International Clay Machinery Co., Dayton, O.
Treadwell, M. H., Co., 140 Cedar St., N. Y. C.
Zelnicker, Walter A., Supply Co., St. Louis, Mo.

CASE HARDENING

Bidle, W. S., Company, Cleveland, O.
Norfolk Hardening Works, Inc., Boston, Mass.
Steel Improvement & Forge Co., Cleveland, O.
Wiedemann Machine Co., Philadelphia, Pa.

CASTINGS

Brass, Bronze and Aluminum

American Brass Forging Co., 168 So. Boulevard, New York City.
American Bronze Corp., Berwyn, Pa.
Berbecker & Rowland Mfg. Co., Waterville, Ct.
Brass Foundry Co., Peoria, Ill.
Bunting Brass & Bronze Co., Toledo, O.
Chalmers Mfg. Co., Lima, O.
Columbus Brass Company, Columbus, O.
Connecticut Brass Foundry Co., Inc., Waterbury, Ct.
Cross Engineering Co., Carbondale, Pa.
Damascus Bronze Co., Pittsburgh, Pa.
Douglas & Lomason Co., Detroit, Mich.
Eynon Evans Mfg. Co., Philadelphia, Pa.
Fitz Water Wheel Company, Hanover, Pa.
Grayson Tool & Mfg. Co., Dunbar, W. Va.
Ideal Bronze Co., Cleveland, O.
Imperial Brass Mfg. Co., Chicago, Ill.
Keystone Bronze Co., Pittsburgh, Pa.
Lincoln Brass Foundry, Inc., Chester, Pa.
Lumen Bearing Co., Buffalo, N. Y.
McKim Foundry & Machine Co., Lockport, N. Y.
Montpelier Manufacturing Company, Montpelier, Ind.
Monumental Bronze Co., Bridgeport, Ct.
Morgan Engineering Co., Alliance, O.
National Bronze & Aluminum Foundry Co., Cleveland, O.
Phosphor-Bronze Smelting Co., Phila., Pa.
Schroeder, Edward, Lamp Works, Jersey City, N. J.
Spencer's Sons, I. S., Inc., Guilford, Ct.
Spindler & Deringer, Jersey City, N. J.
Sterling Specialty Company, Newcomerstown, Ohio.
Waterbury Brass Goods Corp., Waterbury, Ct.
Wellman Bronze Co., Cleveland, O.
Weston Foundry & Machine Co., Moline, Ill.
Woodard Machine Co., Wooster, O.

Charcoal Iron

Fuller-Lehigh Co., Fullerton, Pa.

Crucible

Crucible Steel Casting Co., Lansdowne, Pa.
Riverside Steel Castings Co., Newark, N. J.
Standard Crucible Steel Casting Co., Milwaukee, Wis.

Die

Acme Die Casting Corp., Bush Terminal No. 5, Brooklyn, N. Y.
Barnhart Bros. & Spindler, Chicago, Ill.
Indiana Die Casting Co., Indianapolis, Ind.
Lough Bros., 90 West St., N. Y. C.
Lumen Bearing Co., Buffalo, N. Y.
Sivyer Steel Casting Co., Milwaukee, Wis.
Stewart Mfg. Co., Chicago, Ill.

Electric Steel

American Steel Foundries, Chicago, Ill.
Connecticut Electric Steel Co., Inc., Hartford, Conn.
Crucible Steel Casting Co., Cleveland, O.
Maynard Electric Steel Castings Co., Milwaukee, Wis.,
Sivyer Steel Casting Co., Milwaukee, Wis.
Treadwell Engineering Co., Easton, Pa.

Gray Iron

Acme Harvesting Machine Co., Peoria, Ill.
Advance Foundry Co., Dayton, O.
Advance-Rumely Company, LaPorte, Ind.
American Cast Ir. Pipe Co., Birmingham, Ala.
American Machine & Mfg. Co., Atlanta, Ga.
American Safety Lamp & Mine Supply Co., Scranton, Pa.
Barker, S. G., & Son, Inc., Scranton, Pa.
Bay View Foundry Co., Sandusky, O.
Bonnot Company, Canton, O.
Burch Plow Works Co., Crestline, O.
Centre Foundry & Machine Co., Wheeling, W. Va.
Chalmers Mfg. Co., Lima, O.
Chambersburg Engineering Co., Chambersburg, Pa.
Chisholm-Moore Mfg. Co., Cleveland, O.
City Foundry Co., Cleveland, O.
Colonial Foundry & Mach. Co., York, Pa.
Columbia Malleable Castings Co., Columbia, Pa.
Connellsville Fdry. Mch. & Steel Casting Co., Pittsburgh, Pa.
Crane, Wm. F., Co., New York City.
Creswell, Samuel J., Iron Works, Philadelphia.
Davenport, John, Company, Stamford, Ct.
Davenport Machine & F'dry Co., Davenport, Iowa.
Davies & Thomas Co., 120 Broadway, New York City.
Davis, Chas. E., Fdy. Co., Inc., Rutland, Vt.
Elmwood Castings Co., St. Bernard, Cincinnati, O.
Excelsior Tool & Machine Co., East St. Louis, Ill.
Fair Haven Foundry & Machine Co., Inc., Fair Haven, Vermont.
Fairmount Foundry Co., Philadelphia, Pa.
Farrer & Trefts, Inc., Buffalo, N. Y.
Finch Mfg. Co., Scranton, Pa.
Flour City Ornamental Iron Co., Minneapolis, Minn.
France Foundry & Machine Company, North Baltimore, O.
Franklin Machine Co., Providence, R. I.
Frederick Iron & Steel Co., Frederick, Md.
French Creek Fdry. Co., Franklin, Pa.
Frog Switch & Mfg. Co., The, Carlisle, Pa.
Fulton Foundry & Mch. Co., Cleveland, O.
Gardner General Foundry Company, Gardner, Mass.
Glens Falls Machine Works, Glens Falls, N. Y.
Gray Foundry, Inc., Poultney, Vt.
Gray Iron Foundry Co., Reading, Pa.
Grayson Tool & Mfg. Co., Dunbar, W. Va.
Greenlee Foundry Co., Chicago, Ill.
Harriman Foundry & Machine Works, Harriman, Tenn.
Hatch, E. R., Manufacturing Co., Rutland, Vt.
Hood Furnace & Supply Co., Corning, N. Y.
Houston Car Wheel & Mch. Co., Houston, Tex.
Hubley Mfg. Co., Lancaster, Pa.
Hyde Park Foundry & Mach. Co., Hyde Park, Pa.
Klotz Machine Co., Sandusky, O.
Lansdale Foundry Co., Lansdale, Pa.
Lebanon Gear & Machine Works, Lebanon, Pa.
Lewis Foundry & Machine Co., Pittsburgh, Pa.
Lough Bros., 90 West St., N. Y. C.
Mackintosh, Hemphill & Co., Pittsburgh, Pa.
Mahoning Foundry & Machine Company, Punxsutawney, Pa.
Mansfield Fdry. Co., Mansfield, Mass.
Manufacturers Iron Foundry, Inc., The, Bridgeport, Ct.
Mascot Stove Manufacturing Co., Chattanooga, Tenn.
Merrill Iron Works, Merrill, Wis.
Metals Production Equip. Co., Springfield, Mass.
Montpelier Manufacturing Company, Montpelier, Ind.
Morgan Engineering Co., Alliance, O.
Munson, E. G., Utica, N. Y.
Murray Company, Atlanta, Ga.
N. E. Foundry & Machinery Co., 133 Forest St., Campello, Mass.
Nagle Corliss Engine Works, Erie, Pa.
National Castings Co., Marietta, Pa.
National Foundry Company of N. Y., Inc., Brooklyn, N. Y.
North Lebanon Foundry Co., Inc., Lebanon, Pa.
North Wales Machine Co., North Wales, Pa.
Patch, F. R., Manufacturing Co., Rutland, Vt.
Penn Fdry. & Mfg. Co., Reading, Pa.
Pequonnock Fdry, Inc., Bridgeport, Ct.
Portland Foundry Company, Portland, Ct.
Record Foundry & Machine Co., Livermore Falls, Maine.
Red Jacket Mfg. Co., Davenport, Iowa.
Richey, Browne & Donald, Inc., Maspeth, N. Y.
Robins Conveying Belt Co., Passaic, N. J.
Sanitary Company of America, Linfield, Pa.
Sessions Foundry Co., Bristol, Ct.
Silver Mfg. Co., Salem, O.
Simpson Foundry Company, Newark, O
Smith, Philip, Mfg. Co., Sydney, O.
Spencer's, I. S., Sons, Inc., Guilford, Ct.
Starke's Dixie Plow Works, Inc., Richmond, Va.
Steele & Condict, Inc., Jersey City, N. J.
Stowell Co., South Milwaukee, Wis.
Straight Line Engine Co., Syracuse, N. Y.
Sweet & Doyle Fdry. & Mch. Co., Green Island, N. Y.
Swett, A. L., Iron Works, Medina, N. Y.
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.
Textile Machine Works, Reading, Pa.
Turner & Seymour Mfg. Co., Torrington, Ct.
Tuttle & Bailey Mfg. Co., 52 Vanderbilt Ave., New York City.
Union Mfg. Co., New Britain, Ct.
U. S. Cast Iron Pipe & Fdry. Co., Burlington, N. J.
Vogt, Henry, Machine Co., Inc., Louisville, Ky.
Warren Fdry. & Mach. Co., 11 Broadway, New York.
Washburn & Granger, Inc., 50 Church St., N. Y. City.
Williamson, J. E., Co., Bellwood, Pa.
Wood, R. D., & Co., Philadelphia, Pa.
Woodard Machine Co., Wooster, O.
Zieg, F. B., Mfg. Company, Fredericktown, O.

Malleable

Chisholm-Moore Mfg. Co., Cleveland, O.
Columbia Malleable Castings Co., Columbia, Pa.
Decatur Malleable Iron Co., Decatur, Ill.
Fanner Mfg. Co., Cleveland, O.
Jeffrey Mfg. Company, 925 N. 4th St., Columbus, O.
Lakeside Malleable Castings Co., Racine, Wis.
Lough Bros., 90 West St., N. Y. C.
McConway & Torley Company, Pittsburgh, Pa.
Malleable Iron Fittings Co., Branford, Ct.
Marion Malleable Iron Works, Marion, Ind.
Missouri Malleable Iron Co., East St. Louis, Ill.
Peoria Malleable Castings Co., Peoria, Ill.
Richmond Malleable Castings Co., Richmond, Ind.
Standard Malleable Iron Co., Muskegon, Mich.
Stowell Co., South Milwaukee, Wis.
Temple Malleable Iron & Steel Co., Phila., Pa.
Vermilion Malleable Iron Co., Hoopeston, Ill.

Manganese Steel

Frog Switch & Mfg. Co., The, Carlisle, Pa.
Milwaukee Steel Foundry Company, Milwaukee, Wis.
St. Louis Steel Foundry Co., St. Louis, Mo.
Smith, Geo. H., Steel Casting Co., Milwaukee, Wis.
Strong Steel Foundry Co., Buffalo, N. Y.

Semi-Steel

Farrer & Trefts, Inc., Buffalo, N. Y.
Malleable Iron Fittings Co., Branford, Ct.
McLain-Carter Furnace Co., Milwaukee, Wis.
Morgan Engineering Co., Alliance, O.
Pittsburgh Valve, Fdy. & Construction Co., Pittsburgh, Pa.
Woodard Machine Co., Wooster, O.

Steel

Acme Steel Co., Akron, O.
Adamson Mach. Co., Akron, O.
Allison & Co., Chester, Pa.
American Machine & Mfg. Co., Atlanta, Ga.
American Steel Export Co., Woolworth Bldg., New York City.
American Steel Foundries, Chicago, Ill.
Atlantic Steel Castings Co., Chester, Pa.
Atlas Steel Casting Co., Buffalo, N. Y.
Bethlehem Steel Co., So. Bethlehem, Pa.
Birdsboro Steel Foundry & Mch. Co., Birdsboro, Pa.
Burnside Steel Co., Chicago, Ill.
Carbon Steel Casting Company, Lancaster, Pa.
Chester Steel Castings Co., Philadelphia, Pa.
Chicago Steel Foundry Co., Chicago, Ill.
Connecticut Electric Steel Co., Inc., Hartford, Ct.
Connellsville Fdry. Mch. & Steel Casting Co., Pittsburgh, Pa.
Crucible Steel Castings Co., Lansdowne, Pa.
Falk Co., Milwaukee, Wis.
Farrell Cheek Steel Fdry. Co., Sandusky, O.
Federal Steel Fdry. Co., Chester, Pa.
Frog Switch & Mfg. Co., The, Carlisle, Pa.
Grant, Robert, Woolworth Bldg., New York.
Kelly & Jones Co., Greensburg, Pa.
McConway & Torley Company, Pittsburgh, Pa.
McCord & Co., Chicago, Ill.
Malleable Iron Fittings Co., Branford, Ct.
Maynard Electric Steel Castings Co., Milwaukee, Wis.
Michigan Steel Castings Company, Detroit, Mich.
Milwaukee Steel Foundry Company, Milwaukee, Wis.
Morgan Engineering Co., Alliance, O.

Morton Steel Casting Company, Morton, Pa.
National Steel Casting Co., Montpelier, Ind.
Ohio Steel Foundry Co., Springfield, O.
Otis Steel Co., Cleveland, O.
Pelton Steel Co., Milwaukee, Wis.
Penn Seaboard Steel Corp., Philadelphia, Pa.
Philadelphia Roll & Machine Co., Philadelphia, Pa.
Reading Steel Casting Co., Reading, Pa.
Riverside Steel Castings Co., Newark, N. J.
St. Louis Steel Foundry Co., St. Louis, Mo.
Sharon Foundry Co., Sharon, Pa.
Sivyer Steel Casting Co., Milwaukee, Wis.
Smith, Geo. H., Steel Casting Co., Milwaukee, Wis.
Standard Crucible Steel Casting Co., Milwaukee, Wis.
Standard Steel Wks. Co., Phila., Pa.
Strong Steel Foundry Co., Buffalo, N. Y.
Temple Malleable Iron & Steel Co., Phila., Pa.
Union Spring Mfg. Co., Pittsburgh, Pa.
United Engineering & Foundry Co., Pittsburgh, Pa.
Wellman-Seaver-Morgan Co., Cleveland, O.
Wheeling Mold & Fdry. Co., Wheeling, W. Va.

Vanadium

United Engineering & Fdry. Co., Pittsburgh, Pa.

White Bronze

Stewart Mfg. Co., Chicago, Ill.

CEMENT

Belt

Ladew, Edward R., Co., Inc., 137 Centre St., New York.
Schieren, Chas. A., Co., 37 Ferry St., N. Y.

Disc Wheel

Gardner Mach. Co., Beloit, Wis.

Fire-Resisting

Clinton Metallic Paint Co., Clinton, N. Y.
Quigley Furnace Specialties Co., 26 Cortlandt Street, New York City.

Iron

Smooth-on Mfg. Co., Jersey City, N. J.

Rubber

Goodrich, B. F., Co., Akron, O.
N. Y. Belting & Packing Co., 91-93 Chambers St., N. Y.

CENTERING MACHINES

American Equipment Co., Bucyrus, Ohio.
Newton Machine Tool Works, Philadelphia, Pa.
Pratt & Whitney Co., Hartford, Ct.
Whiton, D. E., Mach. Co., New London, Ct.

CERIUM

Electric Reduction Company, Washington, Pa.

CHAINS

Arc Lamp

American Chain Company, Inc., Bridgeport, Ct.

Coal

Larkin, J. K., & Co., 34 Reade St., N. Y.

Coil

American Chain Company, Inc., Bridgeport, Ct.
Bradlee & Co., Philadelphia, Pa.
Bridgeport Chain Co., Bridgeport, Ct.
Columbus McKinnon Chain Co., Columbus, O.
Woodhouse Chain Works, Trenton, N. J.

Conveyor

Abell-Howe Co., Chicago, Ill.
American Chain Company, Inc., Bridgeport, Ct.
Jeffrey Mfg. Company, 925 N. 4th St., Columbus, O.
Jones & Laughlin Steel Co., Pittsburgh, Pa.
Larkin, J. K., & Co., 34 Reade St., N. Y.
Link-Belt Co., Chicago, Ill.
Morse Chain & Mfg. Co., Ithaca, N. Y.
Union Chain & Mfg. Co., Seville, O.
Woodhouse Chain Works, Trenton, N. J.

Crane

American Chain Company, Inc., Bridgeport, Ct.
Bradlee & Co., Philadelphia, Pa.
Woodhouse Chain Works, Trenton, N. J.

Jack

Mattatuck Mfg. Co., Waterbury, Conn.

Machinery

Abell-Howe Co., Chicago, Ill.
Bridgeport Chain Co., Bridgeport, Ct.
Diamond Chain & Mfg. Co., Indianapolis, Ind.
Larkin, J. K., & Co., 34 Reade St., N. Y.

Power Transmission

Baldwin Chain & Mfg. Co., Worcester, Mass.
Diamond Chain & Mfg. Co., Indianapolis, Ind.
Jeffrey Mfg. Company, 925 N. 4th St., Columbus, O.
Link-Belt Co., Chicago, Ill.
Union Chain & Mfg. Co., Seville, O.

Sash

Morton, Thomas, 245 Centre St., N. Y. C.

Sprocket Wheel

American Chain Company, Inc., Bridgeport, Ct.
Bridgeport Chain Co., Bridgeport, Ct.
Cleveland Galvanizing Wks., Cleveland, O.
Cullman Wheel Co., Chicago, Ill.
Diamond Chain & Mfg. Co., Indianapolis, Ind.
Jeffrey Mfg. Company, 925 N. 4th St., Columbus, O.
Link-Belt Co., Chicago, Ill.
McKay, James, Co., Pittsburgh, Pa.
Stowell Co., South Milwaukee, Wis.
Union Chain & Mfg. Co., Seville, O.
Whitney Mfg. Co., Hartford, Ct.

CHAPLETS

Fanner Mfg. Co., Cleveland, O.

CHASERS

Jones & Lamson Mach. Co., Springfield, Vt.
Murchey Machine & Tool Co., Detroit, Mich.

CHECKS

Magnetic

Taft-Peirce Mfg. Company, Woonsocket, R. I.

Metal

Schwerdtle Stamp Co., Bridgeport, Ct.

Time

American Railway Supply Co., 134-136 Charles St., New York City.

Tool

American Railway Supply Co., 134-136 Charles St., New York City.

CHEMICALS

Industrial

Buehanan, C. G., Chemical Co., Cincinnati, O.
Ele-Kem Company, Chicago, Ill.

CHEMISTS

Analytical and Metallurgical

Davis, Geo. C., Philadelphia, Pa.

CHIMNEYS

Radial Brick and Concrete

Heine Chimney Co., Chicago, Ill.

CHROME

Ore

Mineral Products Co., Ltd., San Francisco, Cal.

CHUCKS

Cushman Chuck Co., Hartford, Ct.
Detroit Twist Drill Co., Detroit, Mich.
Gardner Mach. Co., Beloit, Wis.
Hoggson & Pettis Mfg. Co., New Haven, Ct.
Horton, E., & Son Co., Windsor Locks, Ct.
Jacobs Mfg. Co., Hartford, Ct.
Jaeger, M., Cleveland, O.
Jersey City Mach. Co., Jersey City, N. J.
McCrosky Reamer Co., Meadville, Pa.
Parker, Chas. S., 83 Maiden Lane, New York City.
Parker Mfg. Co., Ann Arbor, Mich.
Skinner Chuck Co., New Britain, Ct.
Standard Tool Co., Cleveland, O.
Union Mfg. Co., New Britain, Ct.
Welborne & Co., 45 Beaver St., N. Y. City.
Whiton, D. E., Mach. Co., New London, Ct.

Magnetic

Heald Machine Co., Worcester, Mass.

CINDER MILLS

Water

Whiting Fdry. Equip. Co., Harvey, Ill.

CLAMPS

Western Tool & Mfg. Co., Springfield, O.

Flanging

Hilles & Jones Co., Wilmington, Del.

CLEANER

Metal

Ford, J. B., Co., Wyandotte, Mich.
Oakley Chemical Co., 22 Thames St., New York City.
Rhodes, James H., & Co., Chicago, Ill.

CLEANING MACHINERY

Shell

Phoenix Machine Co., Inc., 21 Park Row, New York City.

CLEANING MATERIALS

Ford, J. B., Co., Wyandotte, Mich.
Oakley Chemical Co., 22 Thames St., New York City.

CLEATS

Barrel

Hubbard & Co., Pittsburgh, Pa.

CLUTCHES

Friction

Brown, A. & F., Co., 79 Barclay St., N. Y.
Brown Engineering Co., Reading, Pa.
Caldwell, W. E., Co., 260 Brandeis St., Louisville, Ky.
Cresson-Morris Co., Philadelphia, Pa.
Eastern Machinery Co., New Haven, Ct.
Falls Clutch & Machinery Co., Cuyahoga Falls, O.
Hess-Snyder Co., Massillon, O.
Hilliard Clutch & Machinery Co., Elmira, N. Y.
Johnson, Carlyle, Machine Co., Manchester, Ct.
Moore & White Co., Philadelphia, Pa.
Reliance Gauge Column Co., Cleveland, O.
Wood's, T. B., Sons Co., Chambersburg, Pa.

Coal

Addy, Matthew, Co., Cincinnati, O.
Alden Coal Mining Co., 1 Broadway, N. Y. C.
Awbrey, S. C., & Co., Fort Smith, Ark.
Hanna, M. A., & Co., Cleveland, O.
Heyward, Thomas R., Co., Pittsburgh, Pa.
McKeefrey & Co., Leetonia, O.
Reilly-Peabody Fuel Co., Pittsburgh, Pa.
Washington Coal & Coke Co., Dawson, Pa.

COAL, ORE AND ASH HANDLING MACHINERY

Alliance Machine Co., Alliance, O.
Barber-Green Company, Aurora, Ill.
Box, Alfred, & Co., Philadelphia, Pa.
Brown Hoisting Machry. Co., Cleveland, O.
Crockwell Mine & Mill Supply Co., St. Louis, Mo.
Gifford-Wood Co., Hudson, N. Y.
Godfrey, John F., Elkhart, Ind.
Guarantee Construction Co., 140 Cedar St., N. Y.
Haiss, Geo., Mfg. Co., 142d St. & Canal Pl., N. Y. C.
Hayward Co., 50 Church St., N. Y.
Industrial Locating Co., Chicago, Ill.
Jeffrey Mfg. Company, 925 N. 4th St., Columbus, O.
Link-Belt Co., Chicago, Ill.
McKee, Arthur G., & Co., Cleveland, O.
Northern Engineering Works, Detroit, Mich.
Orton & Steinbrenner Co., Chicago, Ill.
Portable Machinery Co., Passaic, N. J.
Titan Equipment Co., 30 Church St., N. Y. C.
Wellman-Seaver-Morgan Co., Cleveland, O.

COAL, CARBURIZING EQUIPMENT

Locomotive Pulverized Fuel Co., 30 Church St., N. Y. C.

COILS

Pipe Iron, Copper and Brass

Harrisburg Pipe & Pipe Bending Co., Harrisburg, Pa.

COKE

Addy, Matthew, Co., Cincinnati, O.
Awbrey, S. C., & Co., Fort Smith, Ark.
Hanna, M. A., & Co., Cleveland, O.
Heyward, Thomas R., Co., Pittsburgh, Pa.
Hillman, J. H., & Sons Co., Pittsburgh, Pa.
McKeefrey & Co., Leetonia, O.
Matlock Coal & Iron Corporation, New York City.
Mudge, E. W., & Co., Pittsburgh, Pa.
Pilling & Crane, Philadelphia, Pa.
Reilly-Peabody Fuel Co., Pittsburgh, Pa.
Rogers, Brown & Co., Cincinnati, O.
Stewart Iron Co., Ltd., Cleveland, O.
Tenn. Coal, Iron & R. R. Co., Birmingham, Ala.
Washington Coal & Coke Co., Dawson, Pa.

Furnace

Alden Coal Mining Co., 1 Broadway, N. Y. C.
Awbrey, S. C., & Co., Fort Smith, Ark.
Hillman, J. H., & Sons Co., Pittsburgh, Pa.

COKE-OVEN MACHINERY

Alliance Machine Co., Alliance, O.
Covington Mach. Co., Covington, Va.
Koppers, H., Co., Pittsburgh, Pa.
Wellman-Seaver-Morgan Co., Cleveland, O.

COKE OVENS

By-Product

Smythe, S. R., Co., Pittsburgh, Pa.

Cross Regenerators

Koppers, H., & Co., Pittsburgh, Pa.

With Recovery of By-Products

Koppers, H., Co., Pittsburgh, Pa.

COLD ROLLING MACHINES

Blake & Johnson Co., Waterbury, Ct.

COLLARS

Spacing for Milling Cutters

Detroit Stamping Co., Detroit, Mich.

COLUMNS

Safety Water

Reliance Gauge Column Co., Cleveland, O.

COMMERCIAL VEHICLES

White Co., Cleveland, O.

COMPOUNDS

Case Hardening and Tempering

Buchanan, C. G., Chemical Co., Cincinnati, O.
Ele-Kem Company, Chicago, Ill.

Cyanide Hardening

Ele-Kem Company, Chcago, Ill.

COMPRESSORS

Air

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Chicago Pneumatic Tool Co., Chicago, Ill.
General Electric Company, Schenectady, N. Y.
Ingersoll-Rand Co., 11 B'way, N. Y.
Nagle Corliss Engine Works, Erie, Pa.
Norwalk Iron Works Co., So. Norwalk, Ct.
Spencer Turbine Cleaner Co., Hartford, Ct.
Sullivan Mchry. Co., Chicago, Ill.
Taylor Instrument Companies, Rochester, N. Y.
Welborne & Co., 45 Beaver St., N. Y. City.
Wickes Brothers, Saginaw, Mich.

Second-hand

Machinery Utilities Co., Inc., 501 Fifth Ave., New York City.

CONCRETE CONSTRUCTION

Aberthaw Construction Company, Boston, Mass.
Austin, The, Co., Cleveland, O.
McKee, Arthur G., & Co., Cleveland, O.

CONCRETE INSERTS

Janney, Steinmetz & Co., Philadelphia, Pa.
Star Expansion Bolt Co., 147 Cedar St., N. Y.

CONCRETE MACHINERY

Smith, T. L., Company, Milwaukee, Wis.
Standard Scale & Supply Co., Pittsburgh, Pa.

CONDENSERS

Alberger Pump & Condenser Co., 150 Cedar Street, New York City.
Dean Bros. Steam Pump Works, Indianapolis, Ind.
Ingersoll-Rand Co., 11 B'way, N. Y. C.
Southwark Fdry. & Mch. Co., Philadelphia, Pa.
Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa.

CONDUCTORS

Armored

Youngstown Sheet & Tube Co., Youngstown, O.

CONDUIT

Flexible Metallic

Youngstown Sheet & Tube Co., Youngstown, O.

CONNECTORS

Solderless

Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa.

CONSTRUCTING ENGINEERS

Guarantee Construction Co., 140 Cedar St., N. Y.

CONTRACTORS

General

Aberthaw Construction Company, Boston, Mass.
Arnold Company, Chicago, Ill.
Austin Co., The, Cleveland, O.
Chase, Frank D., Chicago, Ill.
Lackawanna Bridge Co., 2 Rector St., N. Y. C.
McKee, Arthur G., & Co., Cleveland, O.
Worden-Allen Co., Milwaukee, Wis.

CONTRACTORS' SUPPLIES

Second-hand

Albert & Davidson, Inc., Brooklyn, N. Y.
Atlantic Equipment Co., 149 Broadway, N. Y. City.
Beckwith Machinery Co., Pittsburgh, Pa.
Eagle Pipe Supply Co., 30 Church St., N. Y.
Greene, John M., Philadelphia, Pa.
Pipe & Contractors' Supply Co., 3 Dover St., N. Y.

CONTROLLERS

Electric

Electric Controller & Mfg. Co., Cleveland, O.
General Electric Company, Schenectady, N. Y.
Morgan Engineering Co., Alliance, O.
Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa.

Temperature

Brown Instrument Co., Philadelphia, Pa.
Taylor Instrument Companies, Rochester, N. Y.

CONVERTERS

Steel, Side-Blow

Whiting Foundry Equipment Co., Harvey, Ill.

CONVEYERS

Portable

Barber-Green Company, Aurora, Ill.

CONVEYING AND ELEVATING MACHINERY
Barber-Green Company, Aurora, Ill.
Caldwell, H. W., & Son Co., Chicago, Ill.
Gifford-Wood Co., Hudson, N. Y.
Godfrey, John F., Elkhart, Ind.
Guarantee Construction Co., 140 Cedar St., N. Y.
Jeffrey Mfg. Company, 925 N. 4th St., Columbus, O.
Link-Belt Co., Chicago, Ill.
McKee, Arthur G., & Co., Cleveland, O.
Portable Machinery Co., Passaic, N. J.
Robins Conveying Belt Co., Passaic, N. J.
Standard Sand & Machine Co., Cleveland, O.

COPING MACHINES
Cleveland Punch & Shear Works Co., Cleveland, O.
Hilles & Jones Co., Wilmington, Del.

COPPER
Syracuse Smelting Works, Brooklyn, N. Y.
United Smelting & Aluminum Co., New Haven, Ct.
Boronic-Alloying (Shot)
American Boron Products Company, Reading, Pa.

CORE COMPOUND
Smith, Werner G., Co., Cleveland, O.

CORE MACHINES
Brown Specialty Machinery Co., Chicago, Ill.

CORNICE BRAKES
Dreis & Krump Mfg. Co., Chicago, Ill.

CORRUGATED MACHINERY
Streine Tool & Mfg. Co., New Bremen, O.

CORUNDUM WHEELS
See Grinding Wheels

COTTER SAND KEYS
Spring
American Chain Company, Inc., Bridgeport, Ct.
American Steel Co., Pittsburgh, Pa.
Gem Stopper Co., Inc., Philadelphia, Pa.
Hindley Mfg. Co., Valley Falls, R. I.
Hubbard Spring Works, Pontiac, Mich.
National Screw & Tack Co., Cleveland, O.

COUNTERBORES
Detroit Twist Drill Co., Detroit, Mich.

COUNTING MACHINES
Durant Mfg. Co., Milwaukee, Wis.
Hart, R. A., Mfg. Co., Battle Creek, Mich.
Root Co., C. J., Bristol, Ct.
Veeder Mfg Co., Hartford, Ct.

COUPLINGS
Cut-off, Friction
Hilliard Clutch & Machinery Co., Elmira, N. Y.
Johnson, Carlyle, Machine Co., Manchester, Ct.
Flange
Bond Fdry. & Mach. Co., Manheim, Pa.
Cumberland Steel Co., Cumberland, Md.
Flexible
Dexter, I. H., Co., 27 Walker Street, New York City.
Friction Clutch
Caldwell, W. E., Co., 260 Brandeis St., Louisville, Ky.
Johnson, Carlyle, Machine Co., Manchester, Ct.
Hose
Clark, W. J., Co., Salem, O.
Cleveland Penumatic Tool Co., Cleveland, O.
Independent Pneumatic Tool Co., Chicago, Ill.
Shafting
Nicholson, W. H., & Co., Wilkes-Barre, Pa.
Shafting, Flexible
Dexter, I. H., Co., 27 Walker St., N. Y. C.

CRANES
Electric Traveling
Abell-Howe Co., Chicago, Ill.
Alliance Machine Co., Alliance, O.
Barber-Foster Eng. Co., Cleveland, O.
Box, Alfred, & Co., Philadelphia, Pa.
Champion Engineering Co., Kenton, O.
Chesapeake Iron Works, Baltimore, Md.
Cleveland Crane & Engine Co., Wickliffe, O.
Erie Steel Construction Co., Erie, Pa.
Euclid Crane & Hoist Co., Euclid, O.
Failor-Martin Corporation, 1689 Woolworth Bldg., New York City.
Manning, Maxwell & Moore, Inc., 119 W. 40th St., N. Y.
Maris Brothers, Philadelphia, Pa.
Milwaukee Elec. Crane & Mfg. Co., Milwaukee, Wis.
Mitchell-Tappen Company, 15-17 John Street, New York City.
Morgan Engineering Co., Alliance, O.
N. J. Foundry & Machine Co., 140 Cedar St., New York.
Niles-Bement-Pond Co., 111 Broadway, N. Y.
Northern Engineering Works, Detroit, Mich.
Pawling & Harnischfeger Co., Milwaukee, Wis.
Payne, N. B., 25 Church St., New York City.
Pittsburgh Crane & Equipment Co., Pittsburgh, Pa.
Schoonmaker, A. G., & Sons, 25 Church St., N. Y. C.
Scully-Jones & Co., Chicago, Ill.
Shaw Electric Crane Co., 119 W. 40th St., N. Y.
Shepard Electric Crane & Hoist Co., Montour Falls, N. Y.
Titan Equipment Co., 30 Church St., N. Y. C.
Whiting Foundry Equipment Co., Harvey, Ill.
Hand
Gilbert-Grant Co., 141 Broadway, New York.
Hand Power
Alliance Machine Co., Alliance, O.
Box, Alfred, & Co., Philadelphia, Pa.
Brown Hoisting Machry. Co., Cleveland, O.
Cleveland Crane & Engine Co., Wickliffe, O.
Erie Steel Construction Co., Erie, Pa.
Euclid Crane & Hoist Co., Euclid, O.
Industrial Works, Bay City, Mich.
Maris Brothers, Philadelphia, Pa.
N. J. Foundry & Machine Co., 140 Cedar St., New York.
Niles-Bement-Pond Co., 111 Broadway, N. Y.
Northern Engineering Works, Detroit, Mich.
Pittsburgh Crane & Equipment Co., Pittsburgh, Pa.
Q. M. S. Co., 1761 Elston Ave., Chicago, Ill.
Roeper Crane & Hoist Works, Reading, Pa.
Shaw Electric Crane Co., 119 W. 40th St., N. Y.
Whiting Fdry. Equip. Co., Harvey, Ill.
Locomotive
Brown Hoisting Machry. Co., Cleveland, O.
Browning Co., Cleveland, O.
Byers, John F., Machine Co., Ravenna, O.
Cleveland Crane & Eng. Co., Wickliffe, O.
Industrial Works, Bay City, Mich.
Link-Belt Co., Chicago, Ill.
Ohio Locomotive Crane Co., Bucyrus, O.
Orton & Steinbrenner Co., Chicago, Ill.
Titan Equipment Co., 30 Church St., N. Y. C.
Williams, G. H., Company, Erie, Pa.
Pontoon
Wellman-Seaver-Morgan Co., Cleveland, O.
Portable
Abell-Howe Co., Chicago, Ill.
Brown Hoisting Machry. Co., Cleveland, O.
Canton Foundry & Mach. Co., Canton, O.
Franklin Portable Crane & Hoist Co., Franklin, Pa.
Williams, G. H., Company, Erie, Pa.

CRANK SHAFTS
Allison & Co., Chester, Pa.
Bay City Forge Co., Erie, Pa.
Camden Forge Co., Camden, N. J.
Leard, W. E., Works, New Brighton, Pa.
Standard Gauge Steel Co., Beaver Falls, Pa.

CROSS ARMS
Creosoted
Jennison-Wright Co., Toledo, O.

CROSS TIES
Steel
Carnegie Steel Co., Pittsburgh, Pa.

CRUCIBLES
Dixon, Jos., Crucible Co., Jersey City, N. J.
McCullough-Dalzell Crucible Co., Pittsburgh, Pa.
Platinum
Baker & Co., Inc., Newark, N. J.

CRUSHING MACHINERY
Fuller-Lehigh Co., Fullerton, Pa.
Jeffrey Mfg. Company, 925 N. 4th St., Columbus, O.

CUPOLAS
Foundry
Northern Engineering Works, Detroit, Mich.
Paxson, J. W., Philadelphia, Pa.
Whiting Foundry Equipment Co., Harvey, Ill.

CUPS
Cupro-nickel
Stamford Rolling Mills Co., Springdale, Ct.
Oil
Greer, Frederick, Chicago, Ill.

CUTTERS
Bolt
Landis Mach. Co., Waynesboro, Pa.
National Machry. Co., Tiffin, O.
Gear
Whiton, D. E., Mach. Co., New London, Ct.
Key Seating
Lapointe, J. N., Co., New London, Ct.
Milling
Advance Tool Co., Cincinnati, O.
Alvord Reamer & Tool Co., Millersburg, Pa.
Bilton Machine Tool Co., Bridgeport, Ct.
Cleveland Milling Mach. Co., Cleveland, O.
Cleveland Power Transmission Co., Cleveland, Ohio.
Cowles Tool Company, Cleveland, O.
Detroit Twist Drill Co., Detroit, Mich.
Jaeger, M., Cleveland, O.
Mergenthaler Co., Baltimore, Md.
National Tool Co., Cleveland, O.
Reliance Steel & Tool Co., Inc., 24-26 Murray St., New York City.
New York City.
Standard Tool Co., Cleveland, O.
Union Twist Drill Co., Athol, Mass.
Pipe
Trimont Mfg. Co., Roxbury, Mass.
Thread
Rivett Lathe & Grinder Co., Brighton, Boston, Mass.
Wire
Chandler & Farquhar Co., Boston, Mass.
Shuster, F. B., Co., New Haven, Ct.

CUTTING AND WELDING APPARATUS
Oxy-Acetylene
Davis-Bournonville Co., Jersey City, N. J.
Imperial Brass Mfg. Co., Chicago, Ill.
Messer Mfg. Co., Philadelphia, Pa.
Milburn, Alexander, Co., Baltimore, Md.
Oxweld Acetylene Co., Chicago, Ill.

CUTTING COMPOUNDS
Cataract Refining & Mfg. Co., Buffalo, N. Y.
Damascus Mfg. Co., Cleveland, O.
Fiske Bros. Refining Co., 24 State St., New York City.
Oakley Chemical Co., 22 Thames St., New York City.
Smith, Werner, G., Co., Cincinnati, O.

CUTTING-OFF MACHINES
Cold Saw
Cochrane-Bly Co., Rochester, N. Y.
Espen-Lucas Machine Works, Philadelphia, Pa.
Hill, Clarke & Co., Inc., Boston, Mass.
Newton Machine Tool Works, Philadelphia, Pa.
Q. M. S. Co., 1761 Elston Ave., Chicago, Ill.
Racine Tool & Machine Co., Racine, Wis.
Southwark Fdry. & Mch. Co., Philadelphia, Pa.
Vandyck-Churchill Co., 91-93 Liberty St., New York City.
Pipe
Bignall-Keeler Mach. Works, Edwardsville, Ill.
Shell
American Equipment Co., Bucyrus, O.

CYLINDERS
Hydrogen and Oxygen
Janney, Steinmetz & Co., Philadelphia, Pa.

DEOXIDIZER
Brass
Obermayer, S., Co., Pittsburgh, Pa.

DERRICKS
Beckwith Machinery Co., Pittsburgh, Pa.
Byers, John F., Machine Co., Ravenna, O.

DIALS
Crowe Name Plate & Engineering Co., Chicago, Ill.

DIAMOND TOOLS
Desmond-Stephan Mfg. Co., Urbana, O.
Dickinson, Thos. L., 62 Nassau St., N. Y.
Francis & Co., Hartford, Ct.

DIE BLOCKS
Heppenstall Forge & Knife Co., Pittsburgh, Pa.
Tioga Steel & Iron Co., Philadelphia, Pa.
Wetherill Bros. Co., Boston, Mass.
Wheelock, Lovejoy & Co., 23 Cliff St., N. Y.

DIE FILING MACHINES
Cochrane-Bly Co., Rochester, N. Y.

DIE SINKING MACHINES
Walcott Lathe Co., Jackson, Mich.

DIES
Embossing and Stamping
Matthews, J. H., & Co., Pittsburgh, Pa.
Pittsburgh Steel Stamp Co., Pittsburgh, Pa.
Schwerdtle Stamp Co., Bridgeport, Ct.
Forgings
Dodge Tool Company, Grinnell, Ia.
Gripping and Heading
Marchant, Geo. F., Co., Chicago, Ill.
Pipe Threading
Bignall & Keeler Mach. Works, Edwardsville, Ill.
Screw and Thread Cutting
Greenfield Tap & Die Corp., Greenfield, Mass.
Landis Machine Co., Waynesboro, Pa.
Murchey Machine & Tool Co., Detroit, Mich.
Self-Opening Adjustable
Jones & Lamson Mach. Co., Springfield, Vt.
Murchey Machine & Tool Co., Detroit, Mich.
Rickert-Shafer Company, Erie, Pa.
Sheet Metal Working
Adriance Machine Works, Inc., 253 Van Brunt St., Brooklyn, N. Y.
Bliss, E. W., Co., 11 Adams St., Brooklyn, N. Y.
Cleveland Punch & Shear Works Co., Cleveland, O.
Dewes, A., Company, 199 Lafayette Street, New York City.
Dodge Tool Company, Grinnell, Ia.
England Manufacturing Co., Detroit, Mich.
Ferracute Mach. Co., Bridgeton, N. J.
General Machine & Mfg. Co., Bridgeport, Ct.
Globe Mach. & Stamping Co., Cleveland, O.
Grayson Tool & Mfg. Co., Dunbar, W. Va.
Hoeft & Co., Inc., Chicago, Ill.
Johns Machine & Stamping Works Co., 1715 Leonard St., Cleveland, O.
Loy & Nawrath Co., Newark, N. J.
Meyers, W. F., Tool & Gauge Co., Bedford, Ind.
Modern Tool, Die & Machine Co., Box 316 Columbus, O.
Palmer, J. Frederick, Mfg. Co., Milwaukee Wis.
Pratt & Whitney Co., Hartford, Ct.
Robbins Gamewell & Co., Pittsfield, Mass.
Reliance Die & Stamping Co., Chicago, Ill.
Stoll, D. H., Co., Buffalo, N. Y.
Sundstrom Manufacturing Company, Chicago Ill.
Toledo Mach. & Tool Co., Toledo, O.
V. & O. Press Co., Brooklyn, N. Y.
Worcester Stamped Metal Co., Worcester Mass.
Zeh & Hahnemann Co., Newark, N. J.
Steel Letters and Stamps
Matthews, J. H., & Co., Pittsburgh, Pa.
Pittsburgh Steel Stamp Co., Pittsburgh, Pa.

DISCS
Abrasive
Gardner Mach. Co., Beloit, Wis.

DOLOMITE
Dead Burned
Basic Products Co., Pittsburgh, Pa.

DOORS AND PARTITIONS
Steel
Lupton's, David, Sons Co., Philadelphia, Pa.

DOORS AND SHUTTERS
Steel Rolling
Edwards Mfg. Co., Cincinnati, O.

DRILLING MACHINES
Bench
Barnes, W. F. & Jno. Co., Rockford, Ill.
Cincinnati Pulley Mach. Co., Covington, Ky.
Moline Tool Company, Moline, Ill.
Electric Radial
Independent Pneumatic Tool Co., Chicago, Ill.
Multiple Spindle
Barnes Drill Co., Rockford, Ill.
Colburn Machine Tool Co., Franklin, Pa.
Moline Tool Co., Moline, Ill.
Multiple Spindle, Adjustable
Barnes, W. F. & Jno., Co., Rockford, Ill.
Newton Machine Tool Works, Philadelphia Pa.
Multiple Spindle Horizontal
Fox Machine Co., Jackson, Mich.

Multiple Spindle, Vertical
Barnes Drill Co., Rockford, Ill.
Cincinnati Pulley Mach. Co., Covington, Ky.
Sipp Machine Co., Paterson, N. J.
Portable
Cleveland Punch & Shear Wks., Cleveland, O.
Portable Electric
Cincinnati Electrical Tool Co., Cincinnati, O.
Neil & Smith Electric Tool Co., Cincinnati, O.
Standard Electric Tool Co., Cincinnati, O.
Portable Pneumatic
Chicago Pneumatic Tool Co., Chicago, Ill.
Cleveland Pneumatic Tool Co., Cleveland, O.
Independent Peumatic Tool Co., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, N. Y. C.
Sullivan Machinery Co., Chicago, Ill.
Post
Canedy-Otto Mfg. Co., Chicago Heights, Ill.
Radial
American Tool Works Co., Cincinnati, O.
Canedy-Otto Mfg. Co., Chicago Heights, Ill.
Cincinnati Bickford Tool Co., Oakley, Cincinnati, O.
Cleveland Punch & Shear Works Co., Cleveland, O.
Dreses Machine Tool Co., Cincinnati, O.
Hammond Mfg. Co., Cleveland, O.
Harrington, E., Son & Co., Inc. Philadelphia, Pa.
Henry & Wright Mfg. Co., Hartford, Ct.
Niles-Bement-Pond Co., 111 Broadway, N. Y. C.
Reed-Prentice Co., Worcester, Mass.
Taylor & Fenn Co., Hartford, Ct.
Rock
Ingersoll-Rand Co., 11 Broadway, N. Y.
Sullivan Machinery Co., Chicago, Ill.
Second-hand
Harris Bros Co., Chicago, Ill.
Sensitive
Bilton Machine Tool Co., Bridgeport, Ct.
Canedy-Otto Mfg. Co., Chicago Heights, Ill.
Cincinnati Pulley Mach Co., Covington, Ky.
Henry & Wright Mfg. Co., Hartford, Ct.
Royersford Foundry Machine Co., Royersford, Pa.
Sipp Machinery Co, Paterson, N. J.
Taylor & Fenn Co., Hartford, Ct.
Vertical
Barnes Drill Co., Rockford, Ill.
Barnes, W. F. & Jno., Co., Rockford, Ill.
Canedy-Otto Mfg. Co., Chicago Heights, Ill.
Champion Blower & Forge Co., Lancaster, Pa.
Cincinnati Bickford Tool Co., Oakley, Cincinnati, O.
Colburn Machine Tool Co., Franklin, Pa.
Davis Mach. Tool Co., Inc., Rochester, N. Y.
Harrington E., Son & Co., Inc., Philadelphia, Pa.
Henry & Wright Mfg. Co., Hartford, Ct.
McCabe, J. J., Lathe & Machinery Corporation, 149 Broadway, N. Y.
Niles-Bement-Pond Co., 111 Broadway, N. Y. C.
Pratt & Whitney Co., Hartford, Ct.
Prentiss, Henry & Co., Inc., 149 Broadway, N. Y.
Rockford Lathe & Drill Co., Rockford, Ill.
Royersford Foundry Machine Co., Royersford, Pa.
Silver Mfg. Co., Salem, O.
Sipp Machine Co., Paterson, N. J.

DRIVES
Silent Chain
Link-Belt Co., Chicago, Ill.

DROP FORGINGS
See Forgings, Drop

DROP HAMMERS
See Hammers, Drop

DROP PRESSES
See Presses, Drop

DRYERS
Mold
American Blower Co., Detroit, Mich.
Mahr Mfg. Co., Minneapolis, Minn.

DRYERS FOR ALL MATERIAL
American Blower Co., Detroit, Mich.
Bonnot Co., Canton, O.
Cummer, F. D., & Son Co., Cleveland, O.
Link-Belt Co., Chicago, Ill.

DUST COLLECTORS
Sly, W. W., Mfg. Company, Cleveland, O.
Sterling Blower Co., Hartford, Ct.
Whiting Foundry Equipment Co., Chicago, Ill.

DUST HANDLING EQUIPMENT
Pangborn Corporation, Hagerstown, Md.

ECONOMIZERS
Fuel
Uniflow Boiler Co., Philadelphia, Pa.

ELECTRIC APPARATUS
Crocker-Wheeler Co., Ampere, N. J.
Electro Dynamic Co., Bayonne, N. J.
Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa.

ELECTRIC WELDING
See Welding, Electric

ELECTRICAL EQUIPMENT
Second Hand
Bunton & Bockius, Pittsburgh, Pa.

ELECTRICAL MACHINERY
Second Hand
Ackerley, Hiram E., 70-76 Fulton St., N. Y. C.
Baldwin & Copeland, Jersey City, N. J.
Delta Electrical Engineering Co., Philadelphia, Pa.
Gregory Electric Co., Chicago, Ill.
MacGovern & Co., Inc., 114 Liberty St., N. Y.
Power Machinery Exchange, Inc., 1 Montgomery St., Jersey City, N. J.
Sachsenmaier, George & Co., Philadelphia, Pa.

ELECTRO PLATING
Autoyre Co., Oakville, Conn.
Keystone Screw Co., Philadelphia, Pa.
Standard Tool & Mfg. Co., Detroit, Mich.
Winfield Mfg. Company, Warren, O.

ELEVATOR GUIDES
Cold Compressed
Standard Gauge Steel Co., Beaver Falls, Pa.

ELEVATOR SLIDES
Fitzsimmons Co., Youngstown, O.

ELEVATORS
Belt and Electric
Portable Machinery Co., Passaic, N. J.
Portable Revolving
Revolvator Co., Jersey City, N. J.
Steam Hydraulic
Ridgway, Craig & Son Co., Coatesville, Pa.

EMERY STANDS
Cleveland Punch & Shear Works Co., Cleveland, O.

EMERY WHEEL DRESSERS AND CUTTERS
Calder, Geo. H., Lancaster, Pa.
Chicago Screw Co., Chicago, Ill.
Desmond-Stephan Mfg. Co., Urbana, O.
Diamond Saw & Stamping Wks., Buffalo, N. Y.
Dickinson, Thos. L., 62 Nassau St., N. Y.
Francis & Co., Hartford, Ct
Parker, Chas. S., 83 Maiden Lane, New York City.
Western Tool & Mfg. Co., Springfield, O.

EMERY WHEELS
See Grinding Wheels

ENAMELING
Geuder, Paeschke & Frey Co., Contract Mfg Division, Milwaukee, Wis.

ENAMELS
Air Drying and Baking
Moller & Schumann, Marcy & Fushing Aves., Brooklyn, N. Y.

ENGINEERS
Constructing
Arnold Company, Chicago, Ill.
McKee, Arthur G., & Co., Cleveland, O.
Consulting
Abbott, W. G., Jr., Wilton, N. H.
Barnum-Richardson Co., Lime Rock, Conn.
Chase, Frank D., Chicago, Ill.
Day & Zimmerman, Inc., Philadelphia, Pa.
Duff, Samuel E., Pittsburgh, Pa.
Ellis, Frank I., Pittsburgh, Pa.
Fletcher-Thompson, Inc., Bridgeport, Conn.
Gilbreth, Frank B., Inc., Providence, R. I.
Hooper Falkenau Eng. Co., Woolworth Bldg., N. Y.
Lane, H. M., Co., Detroit, Mich.
Leslie-Stevens Co., Inc., 120 Broadway, N. Y. C.
McKee, Arthur G., Inc., & Co., Cleveland, O.
Moore, W. E., & Co., Pittsburgh, Pa.
Shover, Barton R., Pittsburgh, Pa.
Souther, Henry, Engineering Co., Hartford, Ct
Fuel
Kenworthy, Charles F., Waterbury, Ct.
Heat Treating
American Incandescent Heat Co., Inc., Boston, Mass.
Wetherill, Robt., & Co., Chester, Pa.
Industrial
Aberthaw Construction Company, Boston, Mass.
Austin, The, Co., Cleveland, O.
Fletcher-Thompson, Inc., Bridgeport, Conn.
Gilbert & Barker Mfg. Co., Springfield, Mass.
Mechanical
Fletcher-Thompson, Inc., Bridgeport, Conn.
Powdered Coal Equipment
Locomotive Pulverized Fuel Co., 30 Church St., N. Y. C.
Quigley Furnace Specialties Co., 26 Cortlandt Street, New York City.
Refrigerating
Fletcher-Thompson, Inc., Bridgeport, Conn.

ENGINEERS AND CONTRACTORS
Aberthaw Construction Company, Boston, Mass.
American Steel Export Co., Woolworth Bldg., New York City.
Arnold Company, Chicago, Ill.
Austin Co., The, Cleveland, O.
Blair-Engineering Co., 17 Battery Pl., N. Y. C.
Bonnot Co., Canton, O.
Freyn, Brassert & Company, Chicago, Ill.
Fuller Eng. Co., Allentown, Pa.
Hamilton & Hansell, 15-21 Park Row, N. Y. C.
Kennedy, Julian, Pittsburgh, Pa.
Laughlin, Alex., & Co., Pittsburgh, Pa.
Lindsay, W. W., & Co. Inc., Philadelphia, Pa.
McClure, G. W., Son & Co., Pittsburgh, Pa.
Moyer, Albert W., Singer Bldg., New York City.
Orth, Frank, Indiana Harbor, Ind.
Pennsylvania Engineering Wks., New Castle, Pa.
Smythe, S. R., Co., Pittsburgh, Pa.
Swindell, W., & Bros., Pittsburgh, Pa.

ENGINES
Blowing
Mackintosh, Hemphill & Co., Pittsburgh, Pa.
Worthington Pump & Machinery Corp., 115 Broadway, N. Y. C.
Corliss
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Mackintosh, Hemphill & Co., Pittsburgh, Pa.
Mesta Machine Co., Pittsburgh, Pa.
Nagle Corliss Engine Works, Erie, Pa.
United Engineering & Foundry Co., Pittsburgh, Pa.
Gas and Gasoline
Fairbanks, Morse & Company, 30 Church St., N. Y. C.
Machinery Utilities Co., Inc., 501 Fifth Ave., N. Y. C.
Mesta Machine Co., Pittsburgh, Pa.
National Transit Pump & Mch Co., Oil City, Pa.
Reading Iron Co., Reading, Pa.
United Engineering & Foundry Co., Pittsburgh, Pa.
High Speed
American Blower Co., Detroit, Mich.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Erie City Iron Works, Erie, Pa.
Power Machinery Exchange, Inc., 1 Montgomery St., Jersey City, N. J.
Wetherill, Robt., & Co., Inc., Chester, Pa.
Oil
Machinery Utilities Co., Inc., 501 Fifth Ave., N. Y. C.
National Transit Pump & Mch. Co., Oil City, Pa.
Southwark Fdry. & Mch. Co., Philadelphia, Pa.
Second-hand
Archer & Baldwin, Inc., 114 Liberty St., N. Y.
Bath, Cyril J., & Co., Cleveland, O.
Cleveland Belting & Machry. Co., Cleveland, O.
Harris Bros. Co., Chicago, Ill.
Pfannmueller Eng. Co., Chicago, Ill.
Sterling Iron & Steel Company, Philadelphia, Pa.
Washington Co., 39 Cortlandt St., N. Y.
Wickes Machinery Co., Jersey City, N. J.
Steam
Houston, Stanwood & Gamble Co., Cincinnati, O.

EXHAUSTERS
Gas
American Blower Co., Detroit, Mich.
Spencer Turbine Cleaner Co., Hartford, Ct.
Southwark Fdry. & Mch. Co., Philadelphia, Pa.

EXHAUST HEADS
Burt Mfg. Co., Akron, O.
Sterling Blower Co., Hartford, Ct.
Atlas Powder Company, Wilmington, Del.

EXPERIMENTAL WORK
American Cloth Register Co., New Britain, Ct.

EXPORTERS
Eastern Export Co., 30 Church St., N. Y. C.
Federal Export Corp., 42 Broadway, New York, N. Y.
Grant, Robert, Woolworth Bldg., N. Y. C.

EYE BOLT MACHINERY
Williams, White & Co., Moline, Ill.

EYE PROTECTION GLASSES
Standard Optical Co., Geneva, N. Y.
Strong, Kennard & Nutt Co., Cleveland, Ohio.
Wilson, T. A., & Co., Inc., Reading, Pa.

FACING MACHINES
Shell
American Equipment Co., Bucyrus, Ohio.

FACTORIES
Industrial Locating Co., Chicago, Ill.

FACTORY CONSTRUCTION
Arnold Company, Chicago, Ill.
Austin Co., The, Cleveland, O.
McKee, Arthur G., & Co., Cleveland, O.

FACTORY EQUIPMENT
Aberthaw Construction Company, Boston, Mass.
Barrett-Cravens Co., 734 Federal St., Chicago.
Western Tool & Mfg. Co., Springfield, O.

FACTORY FURNITURE
New Britain Mch. Co., New Britain, Ct.
Stevens & Co., 375 Broadway, New York.

FANS
Exhaust
American Blower Co., Detroit, Mich.
Clarage Fan Co., Kalamazoo, Mich.
Ventilating
American Blower Co., Detroit, Mich.

FASTENERS
Corrugated
Acme Steel Goods Co., Chicago, Ill.
Cary Mfg. Co., Manhattan Bridge Plaza.

FEED WATER GREASE EXTRACTORS
American Steam Gauge & Valve Mfg. Co., Boston, Mass.

FEED WATER HEATERS AND PURIFIERS
Alberger Pump & Condenser Co., 150 Cedar Street, New York City.
Frost Mfg. Co., Chicago, Ill.
Harrisburg Pipe & Pipe Bending Co., Harrisburg, Pa.
Harrison Safety Boiler Works, Phila., Pa.
Scaife, William B., & Sons Co., Pittsburgh, Pa.

FEED WATER REGULATORS
American Steam Gauge & Valve Mfg. Co., Boston, Mass.

FELTS
Wool, Mechanical
Booth Felt Co., Inc., 440 19th St., Brooklyn, N. Y.
Rhodes, James H., & Co., Chicago, Ill.

FENCES
Chain Link Wire
Anchor Post Iron Works, 23 Cortlandt St., N. Y. C.
Woven Wire
American Steel & Wire Co., Chicago, Ill.

FENCING
Wire
Wright Wire Co., Worcester, Mass.

FERRO ALLOYS
Ferro-Chromium
Electric Reduction Company, Washington, Pa.
Leavitt, C. W., & Co., 30 Church St., N. Y. C.
Metal & Thermit Corp., 120 B'way, N. Y. City.

Ferro-Manganese
Leavitt, C. W., & Co., 30 Church St., N. Y.
Rogers, Brown & Co., Cincinnati, O.
Samuel, Frank, Philadelphia, Pa

Ferro-molybdenum
Electric Reduction Company, Washington, Pa.
Primos Chemical Co., Primos, Pa.

Ferro-Silicon
Basic Products Co., Pittsburgh, Pa.
Fairbanks, Morse & Company, 30 Church St., N. Y. C.
Metal & Thermit Corp., 120 B'way, N. Y. C.
Rogers, Brown & Co., Cincinnati, O.
Southern Ferro Alloys Company, Chattanooga, Tenn.
U. S. Alloys Corp., 30 E. 42d St., N. Y. C.

Ferro-Titanium
Metal & Thermit Corp., 120 B'way, N. Y. C.
Titanium Alloy Mfg. Co., Niagara Falls, N. Y.

Ferro-Tungsten
Metal & Thermit Corp., 120 B'way, N. Y. C.
Primos Chemical Co., Primos, Pa.
Vanadium Alloy Steel Co., Pittsburgh, Pa.

Ferro-Vanadium
American Vanadium Co., Pittsburgh, Pa.
Basic Products Co., Pittsburgh, Pa.
Electric Reduction Company, Washington, Pa.
Metal & Thermit Corp., 120 B'way, N. Y. C.
Primos Chemical Co., Primos, Pa.

FERRULES
Cleveland Punch & Shear Wks. Co., Cleveland, O.
Gem Stamped Steel Co., Boston, Mass.
Stimson, Edwin B., Company, 70 Franklin Ave., Brooklyn, N. Y.

FIBRE
Hard
Diamond State Fibre Company, Bridgeport, Pa.
Spaulding, J., & Sons Co., Tonawanda, N. Y.

FIBRE PRODUCTS
Spaulding, J., & Sons Co., Tonawanda, N. Y.

FILES AND RASPS
Barnett, G. & H., Co., Philadelphia, Pa.
Delta File Works, Philadelphia, Pa.
Nicholson File Co., Providence, R. I.
Simonds Mfg. Co., Fitchburg, Mass.

FILLET
Patternmakers'
Cutter & Wood Supply Co., Boston, Mass.

FILTERS
Oil
Burt Mfg. Co., Akron, O.
Nugent, Wm. W., & Co., Inc., Chicago, Ill.

FIREPROOF MATERIAL AND CONSTRUCTION
Aspromet Company, Pittsburgh, Pa.
Mitchell-Tappen Company, 15-17 John Street, New York City.

FITTINGS
Hydraulic
Metalwood Mfg. Co., Detroit, Mich.
Southwark Fdry. & Mch. Co., Philadelphia, Pa.
Watson-Stillman Co., 190 Fulton St., N. Y.

Steam and Gas Pipe
Kelly & Jones Co., Greensburg, Pa.
Larkin, J. K., & Co., 34 Reade St., N. Y. C.

FLANGES
Cann & Saul, Philadelphia, Pa
Jefferson Union Co., Lexington, Mass.
Philadelphia Steel & Iron Co., Philadelphia, Pa.

FLASKS
Foundry
Sterling Wheelbarrow Co., Milwaukee, Wis.

FLEXIBLE METAL TUBE MACHINES
Sleeper & Hartley, Inc., Worcester, Mass.

FLOATS
Seamless Copper
Naugatuck Mfg. Co., Naugatuck, Ct.
Reliance Gauge Column Co., Cleveland, O.

FLOORING
Creosoted Wood
Ayer & Lord Tie Co., Chicago, Ill.
Jennison-Wright Co., Toledo, O.
Pittsburgh Wood Preserving Co., Pittsburgh, Pa.

FLUE WELDING MACHINES
Southwark Fdry. & Mch. Co., Philadelphia, Pa.

FLUORSPAR
Heyward, Thomas R., Co., Pittsburgh, Pa.
Rogers, Brown & Co., Cincinnati, O.

FORGES
Buffalo Forge Co., Buffalo, N. Y.
Canedy-Otto Mfg. Co., Chicago Heights, Ill.
Champion Blower & Forge Co., Lancaster, Pa.
Mircs Fuel Oil Equipment Co., Lancaster, Pa.

FORGING MACHINES
Long & Allstatter Co., Hamilton, O.
National Machinery Co., Tiffin, O.
United Engineering & Foundry Co., Pittsburgh, Pa.

FORGINGS
Alloy Steel
Cann & Saul, Philadelphia, Pa.
Morgan Engineering Co., Alliance, O.
Union Switch & Signal Co., Swissvale, Pa.

Automobile
Champion Mach. & Forging Co., Cleveland, O.
Herbrand Co., Fremont, O.
Union Switch & Signal Co., Swissvale, Pa.

Brass and Copper
American Brass Products Co., Pottstown, Pa.

Car
Pittsburgh Knife & Forging Co., Pittsburgh, Pa.

Carriage
Clapp, E. D., Mfg. Co., Auburn, N. Y.
Cleveland Hardware Co., Cleveland, O.
Eccles, Richard, Co., Auburn, N. Y.

Die
Crucible Steel Forge Co., Cleveland, O.

Drop
Barcalo Mfg. Company, Buffalo, N. Y.
Belden Machine Co., New Haven, Ct.
Bethlehem Steel Co., S. Bethlehem, Pa.
Canton Drop Forging & Mfg. Co., Canton, O.
Champion Mach. & Forging Co., Cleveland, O.
Clapp, E. D., Mfg. Co., Auburn, N. Y
Columbus Forge & Iron Co., Columbus, O.
Detroit Forging Co., Detroit, Mich.
Drop Forging Co. of New York, Jersey City, N. J.
Eccles, Richard, Co., Auburn, N. Y.
Endicott Forging & Mfg. Co., Inc., Endicott, N. Y.
General Drop Forge Co., Buffalo, N. Y.
Henry & Allen, Auburn, N. Y.
Herbrand Co., Fremont, O.
Indianapolis Drop Forging Co., Indianapolis.
Keystone Drop Forge Works, Chester, Pa.
Kilborn & Bishop Co., New Haven, Ct.
Ladish Drop Forge Co., Cudahy, Wis.
McKay, James, Co., Pittsburgh, Pa.
Marine Hardware-Equip. Co., So. Portland, Me.
Michigan Bolt & Nut Works, Detroit, Mich.
Moore Drop Forging Co., Springfield, Mass.
Page-Storms Drop Forge Co., Chicopee, Mass.
Richmond Forgings Corp., Belle Isle, Richmond, Va.
Rockford Drop Forge Co., Rockford, Ill.
Scranton Forging Co., Scranton, Pa.
Spicer Mfg. Co. Corporation, So. Plainfield, N. J.
Standard Parts Co., Cleveland, O.
Steel Car Forge Co., Pittsburgh, Pa.
Strieby & Foote Co., Newark, N. J.
Transue & Williams Steel Forging Corp., Alliance, O.
Union Switch & Signal Co., Swissvale, Pa.
Voght, Henry, Machine Co., Inc., Louisville, Ky.
Western Drop Forge Co., Marion, Ind.
Whitman & Barnes Mfg. Co., Akron, O.
Wilcox, D., Mfg. Co., Mechanicsburg, Pa.
Williams, J. H., & Co., 57 Richards St., Brooklyn, N. Y.

Hydraulic Press
Bethlehem Steel Co., So. Bethlehem, Pa.
Crucible Steel Forge Co., Cleveland, O.
Heppenstall Forge & Knife Co., Pittsburgh, Pa.
Morgan Engineering Co., Alliance, O.
Tioga Steel & Iron Co., Philadelphia, Pa.

Iron and Steel
Acme Harvesting Machine Co., Peoria, Ill.
Akron-Selle Co., Akron, O.
Allison & Co., Chester, Pa.
American Bridge Co., 30 Church Street, New York City.
American Steel Export Co., Woolworth Bldg., New York City.
Bay City Forge Co., Erie, Pa.
Camden Forge Co., Camden, N. J.
Cann & Saul, Philadelphia, Pa.
Champion Mach. & Forging Co., Cleveland, O.
Cleveland Knife & Forge Co., Cleveland, O.
Columbia Machine Works & Malleable Iron Co., Chestnut St. & Atlantic Ave., Brooklyn.
Crucible Steel Forge Co., Cleveland, O.
Dyson, Joseph, & Sons, Cleveland, O.
General Drop Forge Co., Buffalo, N. Y.
Grant, Robert, Woolworth Bldg., N. Y. C.
Heppenstall Forge & Knife Co., Pittsburgh, Pa.
Ladish Drop Forge Co., Cudahy, Wis.
Leard, W. E., Works, New Brighton, Pa.
Morgan Engineering Co., Alliance, O.
National Forge & Tool Co., Irvine, Pa.
Oliver Iron & Steel Co., Pittsburgh, Pa.
Otis Steel Co., Cleveland, O.
Philadelphia Steel & Iron Company, Philadelphia, Pa.
Pittsburgh Forge & Iron Co., Pittsburgh, Pa.
Racine Sattley Factories, Springfield, Ill.
Richmond Forgings Corp., Belle Isle, Richmond, Va.
Standard Steel Wks. Co., Phila., Pa.
Steel Improvement & Forge Co., Cleveland, O.
Tioga Steel & Iron Co., Philadelphia, Pa.
Washburn & Granger, Inc., 50 Church St., N. Y. City.
Youngstown City Forge Co., Youngstown, O.

Machine, Railroad and Engine
Cleveland Knife & Forge Co., Cleveland, O.
Columbus Forge & Iron Co., Columbus, O.
Crucible Steel Forge Co., Cleveland, O.
Donner Steel Company, Buffalo, New York.
Dyson, Joseph, & Sons, Cleveland, O.
Morgan Engineering Co., Alliance, O.
National Forge & Tool Co., Irvine, Pa.
Pittsburgh Forge & Iron Co., Pittsburgh, Pa.
Richmond Forging Corp., Belle Isle, Richmond, Va.

Pipe Flange
Cann & Saul, Philadelphia, Pa.
Tioga Steel & Iron Co., Philadelphia, Pa.

Upset
Pittsburgh Knife & Forge Co., Pittsburgh, Pa.

FORMS
Steel for Concrete Construction
Blaw-Knox Co., Pittsburgh, Pa.

FORWARDING AGENTS
Federal Export Corp., 42 Broadway, New York, N. Y.
Grant, Robert, Woolworth Bldg., N. Y. C.

FOUNDRY EQUIPMENT AND SUPPLIES
Cleveland Osborn Mfg. Co., Cleveland, O.
Clifton-Pratt Company, Cincinnati, O.
Cutter & Wood Supply Co., Boston, Mass.
Indiana Foundry Co., Indiana, Pa.
Mahr Mfg. Co., Minneapolis, Minn.
National Engineering Company, Chicago, Ill.
Newton Machine Tool Works, Philadelphia, Pa.
Obermayer, S., Co., Pittsburgh, Pa.
Paxson, J. W., Co., Philadelphia, Pa.
Scully-Jones & Co., Chicago, Ill.
Sly, W. W., Mfg. Company, Cleveland, O.
Smith, Werner G., Cleveland, O.
Whiting Foundry Equipment Co., Harvey, Ill.

FOUNDRY SPECIALISTS
Barnum Richardson Co., Lime Rock, Ct.

FROGS AND SWITCHES
Railway
Bethlehem Steel Co., So. Bethlehem, Pa.
Indianapolis Switch & Frog Co., Springfield, O.
Koppel, Orenstein-Arthur Co., Pittsburgh, Pa.

FURNACE INSULATION
Armstrong Cork & Insulation Co., Pittsburgh.

FURNACES
Annealing and Case Hardening
Allison & Co., Chester, Pa.
American Incandescent Heat Co., Inc., Boston, Mass.
Bellevue Industrial Furnace Company, Detroit, Mich.
Best, W. N., Inc., 11 Broadway, N. Y.
Economy Furnace Co., Chicopee, Mass.
Engelhard, Chas., 30 Church St., N. Y.
General Combustion Co., Chicago, Ill.
General Electric Company, Schenectady, N. Y.
Gilbert & Barker Mfg. Co., Springfield, Mass.
Hermansen, A., C. E., Woolworth Bldg., New York City.
Johnson Gas Appliance Co., Cedar Rapids, Ia.
Kenworthy, Charles F., Waterbury, Ct.
MacLeod Co., Cincinnati, O.
Metals Production Equipment Co., 165 Broadway, New York City.
Moyer, Albert W., Singer Bldg., New York City.
Railway Materials Co., Chicago, Ill.
Rockwell, W. S., Co., 50 Church St., N. Y.
Standard Fuel Engineering Company, Detroit, Mich.
Strong, Carlisle & Hammond Co., Cleveland, O.

Blast
Hagan, Geo. J., Co., Pittsburgh, Pa.
McClure, G. W., Son & Co., Pittsburgh, Pa.
Pennsylvania Engineering Works, New Castle, Pa.
Riter-Conley Co., Pittsburgh, Pa.
Smythe, S. R., Co., Pittsburgh, Pa.

Brass Melting
Hawley Down Draft Furnace Co., Easton, Pa.
Hermansen, A., C. E., Woolworth Bldg., New York City.
Kenworthy, Charles F., Waterbury, Conn.
Rockwell, W. S., Co., 50 Church St., N. Y.

Corrugated Boiler
American Spiral Pipe Works, Chicago, Ill.

Electric
Bario Metal Corporation, 167 W. 18th Street, N. Y. C.
Brown Instrument Co., Philadelphia, Pa.
Detroit Electric Furnace Co., Detroit, Mich.
Engelhard, Chas., 30 Church St., N. Y.
Hamilton & Hansell, 13-21 Park Row, N. Y. C.
Ludlum Elec. Furnace Co., Woolworth Bldg., N. Y. C.
Moore, W. E., & Co., Pittsburgh, Pa.
Pittsburgh Furnace Co., Pittsburgh, Pa.
Price, T. W., Eng. Co., Inc., Woolworth Building, New York.

Enameling
Hermansen, A., C. E., Woolworth Bldg., New York City.

Forging
General Combustion Co., Chicago, Ill.
Gilbert & Barker Mfg. Co., Springfield, Mass.
Hermansen, A., C. E., Woolworth Bldg., New York City.
Kenworthy, Charles F., Waterbury, Conn.
Moyer, Albert W., Singer Bldg., New York City.
Standard Fuel Engineering Company, Detroit, Mich.
Strong, Carlisle & Hammond Co., 326 Frankford Ave., Cleveland, O.

General Industrial
Hermansen, A., C. E., Woolworth Bldg., New York City.
Kenworthy, Charles F., Waterbury, Conn.
Moyer, Albert W., Singer Bldg., New York City.
Smythe, S. R. Co., Pittsburgh, Pa.

Glass
Hermansen, A., C. E., Woolworth Bldg., New York City.

Hardening in Cyanide and Lead
Bellevue Industrial Furnace Company, Detroit, Mich.
Gilbert & Barker Mfg. Co., Springfield, Mass.
Johnson Gas Appliance Co., Cedar Rapids, Ia.
Standard Fuel Engineering Company, Detroit, Mich.
Strong, Carlisle & Hammond Co., Cleveland, O.

High-Speed Steel
Bellevue Industrial Furnace Company, Detroit, Mich.
Gilbert & Parker Mfg. Co., Springfield, Mass.
Standard Fuel Engineering Company, Detroit, Mich.
Strong, Carlisle & Hammond Co., Cleveland, O.
American Gas Furnace Co., 24 John St., N. Y.

Oil, Coal and Gas
Bellevue Industrial Furnace Company, Detroit, Mich.
Hermansen, A., C. E., Woolworth Bldg., New York City.
Metals Production Equipment Co., 165 Broadway, New York City.
Mircs Fuel Oil Equipment Co., Lancaster, Pa.
Moyer, Albert W., Singer Bldg., New York City.
Standard Fuel Engineering Company, Detroit, Mich.

Open Hearth
Lindsay, W. W., & Co., Inc., Philadelphia, Pa.
McLain-Carter Furnace Co., Milwaukee, Wis.
Orth, Frank, Indiana Harbor, Ind.
Wellman-Seaver-Morgan Co., Cleveland, O.

Rivet
General Combustion Co., Chicago, Ill.
Standard Fuel Engineering Company, Detroit, Mich.

Shrapnel
Hermansen, A., C. E., Woolworth Bldg., New York City.
Moyer, Albert W., Singer Bldg., New York City.
Railway Materials Co., Chicago, Ill.

Smokeless
Hawley Down Draft Furnace Co., Easton, Pa.

Steel Melting
General Combustion Co., Chicago, Ill.

Tempering
Bellevue Industrial Furnace Company, Detroit, Mich.
Gilbert & Barker Mfg. Co., Springfield, Mass.
Hermansen, A., C. E., Woolworth Bldg., New York City.
Johnson Gas Appliance Co., Cedar Rapids, Ia.
Moyer, Albert W., Singer Bldg., New York City.
Standard Fuel Engineering Company, Detroit,
Strong, Carlisle & Hammond Co., Cleveland, O.

FUSED SILICA
Engelhard, Chas., 30 Church St., N. Y.

GALVANIZING

Sherardizing Process
United States Sherardizing Co., New Castle, Pa.

GALVANIZING AND PLATING
Meaker Galvanizing Co., Chicago, Ill.
National Galvanizing Co., Inc., Philadelphia, Pa.

GALVANIZING AND TINNING
Cleveland Galvanizing Works, Cleveland, O.
Gray Iron Foundry Co., Reading, Pa.
Meaker Galvanizing Co., Chicago, Ill.
National Galvanizing Co., Chicago, Ill.
National Galvanizing Co., Inc., Philadelphia, Pa.

GALVANIZING FLUX
Empire Metal Co., Syracuse, N. Y.
Syracuse Smelting Works, Brooklyn, N. Y.

GALVANIZING PLANTS
Erie Foundry Co., Erie, Pa.
Meaker Galvanizing Co., Chicago, Ill.

GAS BURNERS

Enclosed Flame
Oven Equipment & Mfg. Co., New Haven, Ct.

GAS CLEANING PLANTS
Smith Gas Engineering Co., Dayton, O.

GAS COMPRESSORS
Norwalk Iron Works Co., S. Norwalk, Ct.

GAS HOLDERS
Camden Iron Works, Camden, N. J.
Cruse-Kemper Co., Ambler, Pa.
Wood, R. D., & Co., Phila., Pa.

GASKETS

Felt
Booth Felt Co., Inc., 440-19th St., Brooklyn, N. Y.

Leather
Graton & Knight Mfg. Co., Worcester, Mass.

Rubber
Goodrich, B. F., Co., Akron, O.

GAS PRODUCERS
Chapman Eng Co., Mt. Vernon, O.
Duff Patents Co., Pittsburgh, Pa.
Flinn & Driffein Co., Chicago, Ill.
Hagan, Geo. J., Co., Pittsburgh, Pa.
International Clay Machinery Co., Dayton, O.
Koppers, H., Co., Pittsburgh, Pa.
Laughlin, Alex., & Co., Pittsburgh, Pa.

GAS RECOVERY COKE OVENS
Koppers, H., Co., Pittsburgh, Pa.
Machinery Utilities Co., Inc., 501 Fifth Ave., N. Y. City
Morgan Construction Co., Worcester, Mass.
Reading Iron Co., Reading, Pa.
Smith Gas Engineering Co., Dayton, O.
Smythe, S. R., Co., Pittsburgh, Pa.
Swindell, W., & Bros., Pittsburgh, Pa.
Wellman-Seaver-Morgan Co., Cleveland, O.
Wood, R. D., & Co., Philadelphia, Pa.

GATES

Blast
Rockwell, W. S., Co., 50 Church St., N. Y. C.

Fence
American Steel & Wire Co., Chicago, Ill.
Anchor Post Iron Works, 23 Cortlandt St., New York City.

GAUGES

Machinists'
Advance Tool Co., Cincinnati, O.
Delaware Engineering Company, Wilmington, Del.
Dodge Tool Company, Grinnell, Ia.
Greenfield, Tap & Die Corp., Greenfield, Mass.
Meyers, W. F., Tool & Gauge Co., Bedford, Ind.
Palmer, J. Frederick, Mfg. Co., Milwaukee, Wis.
Reliance Die & Stamping Co., Chicago, Ill.
Schoenert, Carl, & Sons, Newark, N. J.
Starrett, L. S., Athol, Mass.

Pressure and Vacuum
American Steam Gauge & Valve Mfg. Co., Boston, Mass.
Brown Instrument Co., Philadelphia, Pa.
Scientific Materials Co., 717 Forbes St., Philadelphia, Pa.
Taylor Instrument Co., Rochester, N. Y.
Watson-Stillman Co., 190 Fulton St., N. Y.

GEAR CUTTING
Acme Gear Co., Philadelphia, Pa.
Akron Gear & Engineering Co., Akron, O.
Albaugh-Dover Co., Chicago, Ill.
Albro-Clem Elevator Co., Philadelphia, Pa.
Brown & Sharpe Mfg. Co., Providence, R. I.
Brown, A. & F., Co., 79 Barclay St., N. Y.
Caldwell, H. W., & Son Co., Chicago, Ill.
Colburn Gear & Mfg. Company, Boston, Mass.
Cresson-Morris Co., Philadelphia, Pa.
Crofoot Gear Works, Inc., Boston, Mass.
Earle Gear & Machine Co., Philadelphia, Pa.
Easton Mach. Co., So. Easton, Mass.
Flather Mfg. Co., The, Nashua, N. H.
Foote Bros. Gear & Mch. Co., Chicago, Ill.
General Electric Company, Schenectady, N. Y.
Gleason Works, Rochester, N. Y.
Grant Gear Works, Boston, Mass.
Hindley Gear Co., Phila, Pa.
Horsburgh & Scott Co., Cleveland, O.
Lebanon Gear & Machine Works, Lebanon, Pa.
Link-Belt Co., Chicago, Ill.
Mesta Machine Co., Pittsburgh, Pa.
New Process Gear Corp., Syracuse, N. Y.
Nilson-Miller Co., Hoboken, N. J.
Nuttall, R. D. Co., Pittsburgh, Pa.
Philadelphia Gear Works, Philadelphia, Pa.
Pittsburgh Gear & Mach. Co., Pittsburgh, Pa.
Pittsburgh Rolls Corp., Pittsburgh, Pa.
Riverside Machine Co., Chester, Pa.
Steel Improvement & Forge Co., Cleveland, O.
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.
Van Dorn & Dutton Co., Cleveland, O.
United Engineering & Foundry Co., Pittsburgh, Pa.
West Side Foundry Co., Troy, N. Y.
Woodard Machine Co., Wooster, O.

GEAR CUTTING MACHINES
Bilton Machine Tool Co., Bridgeport, Ct.
Cincinnati Gear Cutting Mach. Co., Cincinnati, O.
Flather Mfg. Co., The, Nashua, N. H.
Gleason Works, Rochester, N. Y.
Gould & Eberhardt, Newark, N. J.
Newton Machine Tool Works, Philadelphia, Pa.

GEAR HOBBING MACHINES
Bilton Machine Tool Co., Bridgeport, Ct.
Gould & Eberhardt, Newark, N. J.

GEAR PLANING MACHINES
Gleason Works, Rochester, N. Y.

GEARS

Bevel
Van Dorn & Dutton Co., Cleveland, O.

Double Helical Cut
Earle Gear & Machine Co., Philadelphia, Pa.
Fawcus Machine Co., Pittsburgh, Pa.
National Transit Pump & Mach. Co., Oil City, Pa.
Nuttall, R. D., Co., Pittsburgh, Pa.
Woodard Machine Co., Wooster, O.

Fibre
Diamond State Fibre Company, Bridgeport, Pa.

Herringbone
Falk, The, Co., Milwaukee, Wis.
Fawcus Machine Co., Pittsburgh, Pa.
Gleason Works, Rochester, N. Y.
Philadelphia Gear Works, Philadelphia, Pa.
Woodard Machine Co., Wooster, O.

Non-Metallic
Akron Gear & Engineering Co., Akron, O.
Philadelphia Gear Works, Philadelphia, Pa.
Van Dorn & Dutton Co., Cleveland, O.
Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa.

Rawhide
Albaugh-Dover Co., Chicago, Ill.
Chicago Rawhide Mfg. Co., Chicago, Ill.
Foote Brothers Gear & Mch. Co., Chicago, Ill.
Horsburgh & Scott Co., Cleveland, O.
New Process Gear Corp., Syracuse, N. Y.
Van Dorn & Dutton Co., Cleveland, O.

Spiral
Van Dorn & Dutton Co., Cleveland, O.

Spur
Van Dorn & Dutton Co., Cleveland, O.

Worm
Akron Gear & Engineering Co., Akron, O.
Albaugh-Dover Co., Chicago, Ill.
Albro-Clem Elevator Co., Philadelphia, Pa.
Brown & Sharpe Mfg. Co., Providence, R. I.
Hindley Gear Co., Philadelphia, Pa.
New Process Gear Corp., Syracuse, N. Y.
Nuttall, R. D., Co., Pittsburgh, Pa.
Philadelphia Gear Works, Philadelphia, Pa.
Van Dorn & Dutton Co., Cleveland, O.

GENERATORS

Acetylene
Davis-Bournonville Co., Jersey City, N. J.
Millburn, Alexander, Co., Baltimore, Md.
Oxweld Acetylene Co., Chicago, Ill.

Electric
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Crocker-Wheeler Co., Ampere, N. J.
Electro Dynamic Co., Bayonne, N. J.
General Electric Company, Schenectady, N. Y.
Klein, Nathan, & Co., Inc., 208 Centre St., New York City.
Reliance Electric & Engineering Co., Cleveland, O.

Electric, Second-hand
Archer & Baldwin, Inc., 114 Liberty St., N. Y. C.
Bender, Geo., 122-130 Centre St., N. Y. C.
Duquesne Electric & Mfg Co., Pittsburgh, Pa.
Gregory Electric Co., Chicago, Ill.
Harris Brothers Co., Chicago, Ill.
Klein, Nathan, & Co., Inc., 208 Centre St., New York City.
McCoy & Brandt Machinery Co., Pittsburgh, Pa.
MacGovern & Co., Inc., 114 Liberty St., New York City.
Machinery Utilities Co., Inc., 501 Fifth Ave., New York City.
Miller-Owen Electric Co., Pittsburgh, Pa.
Power Machinery Exchange, Inc., 1 Montgomery St., Jersey City, N. J.
Ridlon, Frank, Co., Boston, Mass.
Sachsenmaier, George, & Co., Philadelphia, Pa.
Wilson, H. R., Machinery Co., St. Louis, Mo.

GERMAN SILVER
See Nickel Silver

GILDING
Stamford Rolling Mills Co., Springdale, Ct.

GLOVES

Protective
Parker Rust Proof Co. of America, Detroit, Mich.

GLUE HEATERS
Dart, E. M., Mfg. Co., Providence, R. I.

GOGGLES FOR WORKMEN
Standard Optical Co., Geneva, N. Y.
Strong, Kennard & Nutt Co., Cleveland, O.
Wilson, T. A., & Co., Inc., Reading, Pa.

GRAPHITE
Dixon, Jos., Crucible Co., Jersey City, N. J.

GRATING

Flooring
Irving Iron Works Co., Long Island City, N.Y.

GREASES
Dunnsens Mfg. Co., Cleveland, O.
Fiske Bros. Refining Co., 24 State St., New York City.

GRINDER'S SPECTACLES
Strong, Kennard & Nutt Co., Cleveland, O.

GRINDING AND POLISHING MACHINES
American Equipment Co., Bucyrus, O.
Barnes, W. F. & John, Co., Rockford, Ill.
Besly, Chas. H. & Co., Chicago, Ill.
Bridgeport Safety Emery Wheel Co., Inc. Bridgeport, Ct.
Calder, Geo. H., Lancaster, Pa.
Canedy-Otto Mfg. Co., Chicago Heights, Ill.
Gardner Mach. Co., Beloit, Wis.
Landis Tool Co., Waynesboro, Pa.
Leland-Gifford Co., Worcester, Mass.
New Britain Mch. Co., New Britain, Ct.
Newton Machine Tool Works, Philadelphia, Pa.
Ransom Mfg. Co., Oshkosh, Wis.
Springfield Mfg. Co., Bridgeport, Ct.
Sterling Grinding Wheel Mfg. Co., Tiffin, O.
Webster & Perks Tool Co., Springfield, O.

GRINDING MACHINE ATTACHMENTS
Rivett Lathe & Grinder Co., Brighton, Boston, Mass.

GRINDING MACHINES

Car Wheel
Q M S Co., 1761 Elston Ave., Chicago, Ill.

Cutter
Cincinnati Milling Machine Co., Cincinnati, O.
Grand Rapids Grinding Machine Co., Grand Rapids, Mich.

Cylindrical
Landis Tool Co., Waynesboro, Pa.

Die
Bignall & Keeler Mach. Works, Edwardsville, Ill.

Disc for Metal Work
Besly, Chas. H., & Co., Chicago, Ill.
Gardner Mach. Co., Beloit, Wis.

Disc for Pattern Shop
Gardner Mach. Co., Beloit, Wis.

Drill
Grand Rapids Grinding Machine Co., Grand Rapids, Mich.
Landis Tool Co., Waynesboro, Pa.
Wilmarth & Morman Co., Grand Rapids, Mich.

Electric
Independent Pneumatic Tool Co., Chicago, Ill.

Internal
Heald Machine Co., Worcester, Mass.
Lansing Stamping & Tool Co., Lansing, Mich.
Ott Grinder Co., Indianapolis, Ind.
Rivett Lathe & Grinder Co., Brighton, Boston, Mass.

Motor Driven
Bridgeport Safety Emery Wheel Co., Inc., Bridgeport, Ct.
Landis Tool Co., Waynesboro, Pa.
Ransom Mfg. Co., Oshkosh, Wis
Webster & Perks Tool Co., Springfield, O.

Plain, Universal and Tool
Ott Grinder Co., Indianapolis, Ind.
Thompson Grinder Co., Springfield, O.
Webster & Perks Tool Co., Springfield, O.
Wisconsin Electric Co., Racine, Wis.

Portable Electric
Cincinnati Electric Tool Co., Cincinnati, O.
Neil & Smith Electric Tool Co., Cincinnati, O.
Standard Electric Tool Co., Cincinnati, O.

Portable Pneumatic
Independent Pneumatic Tool Co., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, N. Y. C.

Radial
Rivett Lathe & Grinder Co., Brighton, Boston, Mass.

Reamer and Cutter
Leland-Gifford Co., Worcester, Mass.

Second-hand
Harris Bros. Co., Chicago, Ill.

Surface
Blanchard Mach. Co., Cambridge, Mass.
Taft-Peirce Mfg. Company, Woonsocket, R. I.
Wilmarth & Morman Co., Grand Rapids, Mich.

Swing Frame
Pittsburgh Grinding Wheel Co., Rochester, Pa.

Tool
Blake & Johnson Co., Waterbury, Ct.
Landis Tool Co., Waynesboro, Pa.
Norton Co., Worcester, Mass.
Ransom Mfg. Co., Oshkosh, Wis.
Taylor & Fenn Co., Hartford, Ct.

Universal
Landis Tool Co., Waynesboro, Pa.
Thompson Grinder Co., Springfield, O.
Wilmarth & Morman Co., Grand Rapids, Mich.

Vertical Surface
Blanchard Mach. Co., Cambridge, Mass.
Pratt & Whitney Co., Hartford, Ct.

GRINDING WHEELS
Bridgeport Safety Emery Wheel Co., Inc., Bridgeport, Ct.
Norton Co., Worcester, Mass.
Pennsylvania Grinding Wheel Co., Philadelphia, Pa.
Pittsburgh Grinding Wheel Co., Rochester, Pa.
Springfield Mfg. Co., Bridgeport, Ct.
Sterling Grinding Wheel Mfg. Co., Tiffin, O.

GRIT
Diamond
Harrison Supply Co., Boston, Mass.
Sand Blast
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

GUARDS
Saw
Atkins, E. C., & Co., Inc., Indianapolis, Ind.
Buffalo Wire Works Co., Buffalo, N. Y.
Wire
Swett & Sibley Co., Boston, Mass.

HACK SAW BLADES—
See Saw Blades, and Frames, Hack

HACK SAW MACHINES
Armstrong-Blum Mfg. Co., Chicago, Ill.
Atkins, E. C., & Co., Inc., Indianapolis, Ind.
Diamond Saw & Stamping Wks., Buffalo, N. Y.
Peerless Machine Co., Racine, Wis.
Racine Tool & Machine Co., Racine, Wis.
Thompson, Henry G., & Son Co., New Haven, Ct.
Victor Saw Works, Springfield, Mass.
Western Tool & Mfg. Co., Springfield, O.

HAMMERS
Belt and Motor Driven
Beaudry & Co., Inc., Boston, Mass.
Bradley, C. C., & Son, Syracuse, N. Y.
Kidder, R. E., Co., Worcester, Mass.
Long & Alstatter Co., Hamilton, O.
Mayer Brothers Co., Mankato, Minn.
Nazel Eng. & Mach. Works, Philadelphia, Pa.
Toledo Mach. & Tool Co., Toledo, O.
Drop
Alliance Mfg. Co., Alliance, O.
Chambersburg Eng. Co., Chambersburg, Pa.
Erie Fdry. Co., Erie, Pa.
Massillon Foundry & Machine Co., Massillon, O.
Merrill Bros., Maspeth, N. Y.
Miner & Peck Mfg. Co., New Haven, Ct.
Morgan Engineering Co., Alliance, O.
United Engineering & Foundry Co., Pittsburgh, Pa.
Williams, White & Co., Moline, Ill.
Pneumatic
Cleveland Pneumatic Tool Co., Cleveland, O.
Independent Pneumatic Tool Co., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, N. Y. C.
Oldham, Geo., & Son Co., Philadelphia, Pa.
Pneumatic Forging
Beaudry & Co., Inc., Boston, Mass.
Nazel Eng. & Mach. Works, Philadelphia, Pa.
Q M S Co., 1761 Elston Ave., Chicago, Ill.
Steam
Beaudry & Co., Inc., Boston, Mass.
Chambersburg Engineering Co., Chambersburg, Pa.
Erie Foundry Co., Erie, Pa.
Morgan Engineering Co., Alliance, O.
Yoder Company, Cleveland, O.
Steel
Massillon Foundry & Machine Co., Massillon, O.

HANGERS
Ball Bearing
Gurney Ball Bearing Co., Jamestown, N. Y.
New Departure Mfg. Co., Bristol, Ct.
"S K F" Ball Bearing Co., Hartford, Ct.
Factory Door
McKinney Mfg. Co., Pittsburgh, Pa.
Myers, F. E., & Bro., Ashland, O.
Shaft
Abell-Howe Co., Chicago, Ill.
Bond Fdry. & Mach. Co., Manheim, Pa.
Falls Clutch & Machinery Co., Cuyahoga Falls, O.
Standard Pressed Steel Co., Philadelphia, Pa.

HARDWARE
Wagon
Cleveland Hardware Co., Cleveland, O.
Wrought Steel
Stanley Wks., New Britain, Ct.

HARDWARE MANUFACTURERS
American Brass Forging Co., 168 So. Boulevard, New York City.
Hamilton & DeLoss, Inc., Bridgeport, Ct.
Johns Machine & Stamping Works Co., 1715 Leonard St., Cleveland, O.
Progressive Mfg. Co., Torrington, Ct.
Rollman Manufacturing Co., Mount Joy, Pa.
Schartow Mfg. Co., Milwaukee, Wis.
Union Mfg. Co., New Britain, Ct.
Wagner, E. R., Mfg. Co., North Milwaukee, Wis.

HARROW TEETH
Steel
Inland Steel Co., Chicago, Ill.

HEATING AND VENTILATING APPARATUS
American Blower Co., Detroit, Mich.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.

HEAT TREATING
Bidle, W. S., Company, Cleveland, O.
Chicago Metal Treating Co., Chicago, Ill.
Norfolk Hardening Works, Inc., Boston, Mass.
Pittsburgh Gear & Machine Co., Pittsburgh, Pa.
Steel Improvement & Forge Co., Cleveland, O.

HEATERS
Hot Water
Howard Iron Works, Buffalo, N. Y.

HINGES
Automobile Hood
Waterbury Brass Goods Corp., Waterbury, Ct.
Brass Butt
Waterbury Brass Goods Corp., Waterbury, Ct.
Continuous
Waterbury Brass Goods Corp., Waterbury, Ct.
Wrought Brass Butt
Root, C. J., Co., Bristol, Ct.

HOISTING MACHINES
Byers, John F., Machine Co., Ravenna, O.
Eastern Machinery Co., New Haven, Ct.
Williams, G. H., Company, Erie, Pa.

HOISTS
Air
Abell-Howe Co., Chicago, Ill.
Detroit Hoist & Mach. Co., Detroit, Mich.
Ingersoll-Rand Co., 11 Broadway, N. Y. C.
Northern Eng. Works, Detroit, Mich.
Q M S Co., 1761 Elston Ave., Chicago, Ill.
Shepard Electric Crane & Hoist Co., Montour Falls, N. Y.
Whiting Fdry. Equipment Co., Harvey, Ill.
Chain and Rope
Box, Alfred, & Co., Philadelphia, Pa.
Chisholm-Moore Mfg. Co., Cleveland, O.
Ford Chain Block & Mfg. Co., Philadelphia, Pa.
Harrington, P., Son & Co., Inc., Phila., Pa.
Reading Chain Block Co., Reading, Pa.
Wright Mfg. Co., Lisbon, O.
Yale & Towne Co., 9 East 40th St., N. Y.
Electric
Abell-Howe Co., Chicago, Ill.
Alliance Machine Co., Alliance, O.
Barber-Foster Eng. Co., Cleveland, O.
Box, Alfred, & Co., Philadelphia, Pa.
Detroit Hoist & Mach. Co., Detroit, Mich.
Euclid Crane & Hoist Co., Euclid, O.
Link-Belt Co., Chicago, Ill.
Milwaukee Elec. Crane & Mfg. Co., Milwaukee, Wis.
Northern Engineering Works, Detroit, Mich.
Pawling & Harnischfeger Co., Milwaukee, Wis.
Roeper Crane & Hoist Works, Reading, Pa.
Shaw Electric Crane Co., 119 W. 40th St., N. Y.
Shepard Electric Crane & Hoist Co., Montour Falls, N. Y.
Sprague Electric Works, 527 W. 34th St., N. Y.
Wellman-Seaver-Morgan Co., Cleveland, O.
Williams, G. H., Company, Erie, Pa.
Yale & Towne Mfg. Co., 9 E. 40th St., N. Y. C.
Electric Traveling
Barber-Foster Eng. Co., Cleveland, O.
Box, Alfred, & Co., Philadelphia, Pa.
Euclid Crane & Hoist Co., Euclid, O.
Maris Brothers, Philadelphia, Pa.
Shaw Electric Crane Co., 119 W. 40th St., N. Y.
Shepard Electric Crane & Hoist Co., Montour Falls, N. Y.
Hand
Wright Mfg. Co., Lisbon, O.
Hydraulic
Watson-Stillman Co., 190 Fulton St., N. Y.
Portable
Canton Fdry. & Mach. Co., Canton, O.
Franklin Portable Crane & Hoist Co., Franklin, Pa.
Second-hand
Harris Bros. Co., Chicago, Ill.

HOOPS AND BANDS
Carnegie Steel Co., Pittsburgh, Pa.
Cary Mfg. Co., Manhattan Bridge Plaza, Brooklyn, N. Y.
De Haven Mfg. Co., 60 Columbia Heights, Brooklyn, N. Y.
Phillips Sheet & Tin Plate Co., Weirton, W. Va.
West Leechburg Steel Co., Pittsburgh, Pa.

HOOPS
Wire
American Steel & Wire Co., Chicago, Ill.
Grant, Robert, Woolworth Bldg., N. Y. City.

HORSE SHOES AND CALKS
American Steel & Wire Co., Chicago, Ill.
Burden Iron Co., Troy, N. Y.

HOSE AND TUBING
Air
Goodrich, B. F., Co., Akron, O.
Independent Pneumatic Tool Co., Chicago, Ill.
Oldham, Geo., & Son Co., Philadelphia, Pa.
Flexible Metallic
Pennsylvania Flexible Metallic Tubing Co., Philadelphia, Pa.
Sprague Electric Works, 527 W. 34th St., N. Y.
Oil
Goodrich, B. F., Co., Akron, O.
Pennsylvania Flexible Metallic Tubing Co., Philadelphia, Pa.
Rubber
Goodrich, B. F., Co., Akron, O.
New York Belting & Packing Co., 91-93 Chambers Street, New York City.
Steam, Air and Water
Goodrich, B. F., Co., Akron, O.
Pennsylvania Flexible Metallic Tubing Co., Philadelphia, Pa.

HYDRANTS
Wood, R. D., & Co., Philadelphia, Pa.

HYDRAULIC MACHINERY
Bethlehem Steel Co., S. Bethlehem, Pa.
Chambersburg Eng. Co., Chambersburg, Pa.
Hydraulic Press Mfg. Co., Mount Gilead, O.
Metalwood Mfg. Co., Detroit, Mich.
Morgan Engineering Co., Alliance, O.
Niles-Bement-Pond Co., 111 Broadway, N. Y. C.
Southwark Fdry. & Mch. Co., Philadelphia, Pa.
Treadwell Engineering Co., Easton, Pa.
United Engineering & Foundry Co., Pittsburgh, Pa.
Watson-Stillman Co., 190 Fulton St., N. Y.
Wood, R. D., & Co., Philadelphia, Pa.
Worthington Pump & Machinery Corp., 115 Broadway, N. Y. C.

HYDRAULIC RAMS
Power Specialty Co., 111 Broadway, N. Y.

HYDRAULIC TOOLS
Camden Iron Works, Camden, N. J.
Duff Mfg. Co., Pittsburgh, Pa.
Southwark Fdry. & Mch. Co., Philadelphia, Pa.
Watson-Stillman Co., 190 Fulton St., N. Y.
Wood, R. D., & Co., Philadelphia, Pa.

HYDROGEN & OXY-HYDROGEN GENERATORS AND EQUIPMENT
Davis-Bournonville Co., Jersey City, N. J.
International Oxygen Company, 115 B'way, N. Y. C.

INDICATORS
Revolution
Brown Instrument Co., Philadelphia, Pa.
Steam or Gas Engine
American Steam Gauge & Valve Mfg. Co., Boston, Mass.

INDUSTRIAL RAILWAYS
Easton Car & Construction Co., Easton, Pa.
Koppel, Orenstein-Arthur Co., Pittsburgh, Pa.
Lakewood Engineering Co., Cleveland, O.

INGOT MOLDS
Centre Foundry & Machine Co., Wheeling, W. Va.
Penn Mold & Mfg. Co., Wheeling, W. Va.

INGOTS
Brass
Eastern Brass & Ingot Corp., Waterbury, Ct.
Steel
Crucible Steel Forge Co., Cleveland, O.
Hess Steel Corporation, Baltimore, Md.
Interstate Iron & Steel Co., Chicago, Ill.
McConway & Torley Company, Pittsburgh, Pa.

INJECTORS
Eynon Evans Mfg. Co., Philadelphia, Pa.

INSTRUMENTS
Electric Indicating
Brown Instrument Co., Philadelphia, Pa.
Electric Recording
Sangamo Electric Co., Springfield, Ill.
Hardness Measuring
Holz, Herman A., 1 Madison Ave., N. Y. C.
Shore Instrument & Mfg. Co., 555-557 West 22nd St., N. Y. C.
Recording
American Steam Gauge & Valve Mfg. Co., Boston, Mass.
Bristol Co., Waterbury, Ct.
Brown Instrument Co., Philadelphia, Pa.
Engelhard, Chas., 30 Church St., N. Y.
Scientific Materials Co., 717 Forbes St., Philadelphia, Pa.
Taylor Instrument Companies, Rochester, N. Y.
Thwing Instrument Co., Philadelphia, Pa.

INSULATION
Boiler
Armstrong Cork & Insulation Co., Pittsburgh.
Heat
Armstrong Cork & Insulation Co., Pittsburgh.

IRON
Bar
St. Louis Screw Co., St. Louis, Mo.

IRON AND STEEL
Corrugated
Aspromet Company, Pittsburgh, Pa.
McCullough Iron Co., Wilmington, Del.
Newport Rolling Mill Co., Newport, Ky.
Republic Structural Iron Works Co., Cleveland, O.
Seneca Iron & Steel Co., Buffalo, N. Y.
Merchants
American Pressed Steel Co., Philadelphia, Pa.
Hawkridge Bros. Co., Boston, Mass.
Potts, Horace T., & Co., Phila., Pa.
Snyder, W. P., & Co., Pittsburgh, Pa.
Stevens, Chas. G., Co., Chicago, Ill.
Swedish
Brown-Wales Co., Boston, Mass.
Milne, A., & Co., 745 Washington St., N. Y.
Swedish Iron & Steel Corp., 12 Platt St., N. Y.
Wheelock, Lovejoy & Co., 23 Cliff St., N. Y.

IRON ORE
Hanna, M. A., Co., Cleveland, O.
Marshall, Edward E., Philadelphia, Pa.
Oglebay, Norton & Co., Cleveland, O.
Pilling & Crane, Philadelphia, Pa.
Tod-Stambaugh Co., Cleveland, O.
Wharton Steel Co., Wharton, N. J.

IRONWORK
Ornamental
Belmont Iron Works, Philadelphia, Pa.
Republic Structural Iron Works Co., Cleveland, O.
Snead Architectural Iron Works, Louisville, Ky.

JACKS
Hydraulic
Dudgeon, Richard, Broome & Columbia Sts., N. Y.
Duff Mfg. Co., Pittsburgh, Pa.
Henderer's, A. L., Sons, Wilmington, Del.
National Screw & Tack Co., Cleveland, O.
Southwark Fdry. & Mch. Co., Philadelphia, Pa.
Watson-Stillman Co., 190 Fulton St., N. Y.

JAPAN
Air Drying and Baking
Moller & Schumann Co., Marcy and Flushing Aves., Brooklyn, N. Y.

JIGS, FIXTURES, TOOLS, ETC.
American Cloth Register Co., New Britain, Ct.
American Mach. & Fdry. Co., 5520 2d Ave., Brooklyn, N. Y.

Beaver Tool & Eng. Co., Elkin, Ill.
Bersted Forming Tool Co., Chicago, Ill.
Carpenter, E. W., Mfg. Co., Bridgeport, Ct.
Cummings Machine Works, Boston, Mass.
Delaware Engineering Company, Wilmington, Del.
Dodge Tool Company, Grinnell, Ia.
General Machine & Mfg. Co., Bridgeport, Ct.
General Machine Works, York, Pa.
General Mfg. Co., Detroit, Mich.
Grant Mfg. & Mach. Co., Bridgeport, Ct.
Grayson Tool & Mfg. Co., Dunbar, W. Va.
Johns Machine & Stamping Works Co., 1715 Leonard St., Cleveland, O.
Krag, Franz K., Chicago, Ill.
Manhattan Mach. & Tool Works, Grand Rapids, Mich.
Marvin & Casler Co., Canastota, N. Y.
Matthews Eng. Co., The, Sandusky, O.
Meyers, W. F., Tool & Gauge Co., Bedford, Ind.
Modern Tool, Die & Machine Co., Box 316, Columbus, O.
Moore & Co., Chicago, Ill.
Osborn-Crew Mfg. Co., Cleveland, O.
Palmer, J. Frederick, Mfg. Co., Milwaukee, Wis.
Perry, F. W., Machine Co., Youngstown, O.
Reliance Die & Stamping Co., Chicago, Ill.
Rockford Metal Specialty Co., Rockford, Ill.
Rupp Mfg. Co., Inc., Hagerstown, Md.
S-P Mfg. Co., Cleveland, O.
Schoenert, Carl, & Sons, Newark, N. J.
Scott-Fetzer Machine Co., Cleveland, O.
Siewek Brothers Co., Detroit, Mich.
Steiner Bros., Lima, O.
Sandstrom Manufacturing Company, Chicago, Ill.
Universal Chain Co., Stroudsburg, Pa.
Whiting & Comstock, Hartford, Ct.
Worcester Machine Works, Worcester, Mass.

JOINTS
Universal
Spicer Mfg. Corporation, So. Plainfield, N. J.

KEY SEATING MACHINES
Davis Mach. Tool Co., Inc., Rochester, N. Y.
Lapointe, J. N., Co., New London, Ct.
Newton Machine Tool Works, Philadelphia, Pa.
Pratt & Whitney Co., Hartford, Ct.

KEYS
Machine
Hoole Tool & Supply Co., 84 Walker St., New York City.
Moltrup Steel Products Co., Beaver Falls, Pa.
Morton Mfg. Co., Muskegon, Mich.
Pennsylvania Shafting Co., 261 B'way, N. Y.
Ward's Edgar T., Sons Co., Boston, Mass.
Riveted
Hindley Mfg. Co., Valley Falls, R. I.

KNIVES
Machine
Cleveland Knife & Forge Co., Cleveland, O.
Standard Gauge Steel Co., Beaver Falls, Pa.

LABORATORY SUPPLIES
Scientific Materials Co., 717 Forbes St., Philadelphia, Pa.

LACING
Belt
Crescent Belt Fastener Co., 381 4th Ave., N. Y. C.
Graton & Knight Mfg. Co., Worcester, Mass.
Ladew, Edward R., Co., Inc., 137 Centre St., New York.
Rawhide
Graton & Knight Mfg. Co., Worcester, Mass.
Ladew, Edward R., Co., Inc., 137 Centre St., New York.
Schieren, Chas. A., Co., 37 Ferry St., N. Y.

LADLES
Clark, W. J., Co., Salem, O.
Whiting Foundry Equipment Co., Harvey, Ill.

LAMPS
Arc and Incandescent
General Electric Company, Schenectady, N. Y.

LATH
Metal
Aspromet Company, Pittsburgh, Pa.

LATHE ACCESSORIES AND ATTACHMENTS
Steinle Turret Machine Co., Madison, Wis.

LATHE DOGS
Western Tool & Mfg. Co., Springfield, O.
Williams, J. H., & Co., 57 Richards St., Brooklyn, N. Y.

LATHE PANS
Western Tool & Mfg. Co., Springfield, O.

LATHE SPINDLES
Solid and Hollow Bored
National Forge & Tool Co., Irvine, Pa.

LATHES
Automatic
Reed-Prentice Co., Worcester, Mass.
Axle Turning
Bridgeford Mch. Tool Works, Rochester, N. Y.
Bench
Dalton Mfg. Corp., Inc., 1911 Park Ave., N. Y.
Boring
American Equipment Co., Bucyrus, O.
Brass
Dreses Mach. Tool Co., Cincinnati, O.
Foster Machine Co., Elkhart, Ind.
Warner & Swasey Co, Cleveland, O.
Whitcomb-Blaisdell Mach. Tool Co., Worcester, Mass.
Chucking
Cleveland Crane & Eng. Co., Wickliffe, O.
International Machine Tool Co., Indianapolis, Ind.
Jones & Lamson Mach. Co., Springfield, Vt.
Warner & Swasey Co., Cleveland, O.
Engine
American Tool Works Co., Cincinnati, O.
Bridgeford Mach. Tool Works, Rochester, N. Y.
Canedy-Otto Mfg. Co., Chicago Heights, Ill.
Crawford Machine Tool Co., Inc., 21 Park Row, New York.
Dalton Mfg. Corp., Inc., 1911 Park Ave., N. Y.
Davis Mach. Tool Co., Inc., Rochester, N. Y.
Fairbanks, Morse & Company, 30 Church St., N. Y. C.
Foss, Geo. F., Mach. & Supply Co., Montreal, Canada.
Fulton Machine Tool Co., Chicago, Ill.
Greaves-Klusman Tool Co., Cincinnati, O.
Hamilton Mach. Tool Co., Hamilton, O.
Harrington, E., Son & Co., Inc., Philadelphia.
Hill, Clarke & Co., Inc., Boston, Mass.
Hill, Clarke & Co. of Chicago, Ill.
Hollander Mchry. Co., 3 Howard St., N. Y. C.
Houston, Stanwood & Gamble Co., Cincinnati, O.
Lehmann Machine Co., St. Louis, Mo.
Lodge & Shipley Mach. Tool Co., Cincinnati, O.
McCabe, J. J., Lathe & Machinery Corporation, 149 Broadway, N. Y.
Manning, Maxwell & Moore, Inc., 119 W. 40th St., N. Y.
Monarch Machine Tool Co., Sidney, O.
Niles-Bement-Pond Co., 111 Broadway, N. Y. C.
Pratt & Whitney Co., Hartford, Ct.
Pryibil, P., Machine Co., New York City.
Reed Hdw. Mfg. Co., Cairo, Ill.
Reed-Prentice Co., Worcester, Mass.
Rockford Lathe & Drill Co., Rockford, Ill.
Seneca Falls Mfg. Co., Seneca Falls, N. Y.
Sidney Tool Co., Sidney, O.
Smith, Philip, Mfg. Co., Sydney, O.
South Bend Lathe Works, South Bend, Ind.
Toomey, Frank, Philadelphia, Pa.
Walcott Lathe Co., Jackson, Mich.
Whitcomb-Blaisdell Machine Tool Co., Worcester, Mass.
Wickes Brothers, Saginaw, Mich.
Wickes Machinery Co., Jersey City, N. J.
Worcester Lathe Co., Worcester, Mass.
Extension Gap
Barnes Drill Co., Rockford, Ill.
Barnes, W. F. & Jno., Co., Rockford, Ill.
Prentiss, Henry, & Co., Inc., 149 Broadway, N. Y.
Foot Power
Barnes, W. F. & Jno., Co., Rockford, Ill.
Seneca Falls Mfg. Co., Seneca Falls, N. Y.
Forging
American Equipment Co., Bucyrus, O.
Gun and Shellac Turning
American Equipment Co., Bucyrus, O.
Screw-Cutting
Fulton Machine Tool Co., Chicago, Ill.
Rivett Lathe & Grinder Co., Brighton, Boston, Mass.
Rockford Lathe & Drill Co., Rockford, Ill.
Second-hand
Bertolette Machine Tool Company, Jersey City, N. J.
Harris Bros. Co., Chicago, Ill.
Turret
Acme Mach. Tool Co., Cincinnati, O.
Dreses Machine Tool Co., Cincinnati, O.
Duff Mfg. Co., Pittsburgh, Pa.
Foster Machine Co., Elkhart, Ind.
Fulton Machine Tool Co., Chicago, Ill.
Greaves-Klusman Tool Co., Cincinnati, O.
International Machine Tool Co., Indianapolis, Ind.
Jones & Lamson Mach. Co., Springfield, Vt.
Niles-Bement-Pond Co., 111 Broadway, N. Y. C.
Pratt & Whitney Co., Hartford, Ct.
Reed-Prentice Co., Worcester, Mass.
Steinle Turret Mach. Co., Madison, Wis.
Warner & Swasey Co., Cleveland, O.
Turret Vertical
Bullard Mach. Tool Co., Bridgeport, Ct.
Wood
Barnes, W. F., & Jno., Co., Rockford, Ill.

LEAD
American Zinc, Lead & Smelting Co., 120 Broadway, N. Y. C.
Syracuse Smelting Works, Brooklyn, N. Y.
United Smelting & Aluminum Co., New Haven, Ct.

LEATHER
Cup
Chicago Belting Co., Chicago, Ill.
Ladew, Edward R., Co., Inc., 137 Centre St., N. Y. C.
Schieren, Chas. A., Co., 37 Ferry St., N. Y.
Hydraulic
Ladew, Edward R., Co., Inc., 137 Centre St., N. Y. C.
Schieren, Chas. A., Co., 37 Ferry St., N. Y.
Lace
Schieren, Chas. A., Co., 37 Ferry St., N. Y.
Rawhide
Ladew, Edward R., Co., Inc., 137 Centre St., N. Y. C.
Valve
Graton & Knight Mfg. Co., Worcester, Mass.

LIGHTING AND POWER APPARATUS
Electric
General Electric Company, Schenectady, N. Y.
Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa.

LIMESTONE
McKeefrey & Co., Leetonia, O.

LIMESTONE DRYERS AND PULVERIZERS
Bonnot Co., Canton, O.

LINING
Converter
Edge Hill Silica Rock Co., New Brunswick, N. J.
Cupola
Edge Hill Silica Rock Co., New Brunswick, N. J.
Mica Schist
Edge Hill Silica Rock Co., New Brunswick, N. J.

LINKS
Connecting
Keystone Drop Forge Works, Chester, Pa.

LOADERS
Bucket
Barber-Green Company, Aurora, Ill.
Wagon, Coal, Crushed Stone
Barber-Green Company, Aurora, Ill.
Gifford-Wood Co., Hudson, N. Y.
Haiss, Geo., Mfg. Co., 142d St. & Canal Pl., N. Y. C.
Jeffrey Mfg. Company, 925 N. 4th St., Columbus, O.
Link-Belt Co., Chicago, Ill.
Portable Machinery Co., Passaic, N. J.

LOCKERS
Bernstein Mfg. Co., Philadelphia, Pa.
Edwards Mfg. Company, Cincinnati, O.
Medart, Fred., Mfg. Co., St. Louis, Mo.
Michigan Wire Cloth Co., Detroit, Mich.

LOCOMOTIVES
Electric
Fairlie-Martin Corporation, 1689 Woolworth Bldg., New York City.
General Electric Company, Schenectady, N. Y.
Jeffrey Mfg. Company, 925 N. 4th St., Columbus, O.
Koppel, Orenstein-Arthur Co., Pittsburgh, Pa.
Lakewood Engineering Co., Cleveland, O.
Gasoline
Cummings Machine Co., Minster, O.
Whitcomb, George D., Co., Rochelle, Ill.
Rebuilt
Grimshaw, Wm. B., Co., Philadelphia, Pa.
Southern Iron & Equipment Co., Atlanta, Ga.
Steam
American Locomotive Co., 30 Church St., N. Y. City.
Storage Battery
Jeffrey Mfg. Company, 925 N. 4th St., Columbus, O.
Whitcomb, George D., Co., Rochelle, Ill.

LUBRICANTS
Dearborn Chemical Co., Chicago, Ill.
Dixon, Jos., Crucible Co., Jersey City, N. J.

LUBRICATORS
Hydrostatic
Michigan Lubricator Company, Detroit, Mich.

LUMBER
Creosoted
Ayer & Lord Tie Co., Chicago, Ill.
Jennison-Wright Co., Toledo, O.
Pittsburgh Wood Preserving Co., Pittsburgh, Pa.

MACHINE SCREWS—
See Screws

MACHINE WORK
Acme Harvesting Machine Co., Peoria, Ill.
Adams Bros. Inc., Providence, R. I.
Adamson Mach. Co., Akron, O.
Akins, W. C., Machine Co., Rochester, N. Y.
American Mach. & Fdry. Co., 5520 2d Ave., Brooklyn, N. Y.
Arbuckle & Company, Rushville, Ind.
Atlas Machine Company, Waterbury, Ct.
B. & A. Machine Works, Chicago, Ill.
Barker, S. G., & Son, Inc., Scranton, Pa.
Barnes Mfg. Co., Lanesboro, Pa.
Bass Bros., 82 Walker St., New York, N. Y.
Beatty Machine & Mfg. Co., Hammond, Ind.
Berks Engineering Co., Reading, Pa.
Bridgwater Machine Company, Akron, O.
Clark Novelty Co., Inc., Rochester, N. Y.
Cummings Machine Co., Minster, O.
Delaware Engineering Company, Wilmington, Del.
Detrick & Harvey Mach. Co., Baltimore, Md.
Easton Mach. Co., So. Easton, Mass.
Fair Haven Foundry & Machine Co., Inc., Fair Haven, Vt.
Fiber Barrel Mach. & Mfg. Co., Pittsburgh, Pa.
Foltz Manufacturing & Supply Co., Hagerstown, Md.
France Foundry & Machine Company, North Baltimore, O.
Frederick Iron & Steel Co., Frederick, Md.
Gardner General Foundry Company, Gardner, Mass.
Garvin Mach. Co., 255 Spring, cor. Varick St., N. Y.
General Machine Works, York, Pa.
Grayson Tool & Mfg. Co., Dunbar, W. Va.
Greist Mfg. Co., New Haven, Ct.
Gwynn Engineering Company, Pittsburgh, Pa.
Houston Car Wheel & Mach. Co., Houston, Tex.
Humboldt Machine & Stamping Co., Long Island City, N. Y.
Jersey City Mach. Co., Jersey City, N. J.
Johnson, Carlyle, Machine Co., Manchester, Ct.
Klotz Machine Co., Sandusky, O.
Kremer-Cummins Machine Company, Cleveland, O.
Lambert & Todd Mach. Co., Camden, N. J.
Lebanon Gear & Machine Works, Lebanon, Pa.
Lippincott, A. H. & F. H., Philadelphia, Pa.
Marble Arms & Mfg. Co., Gladstone, Mich.
Marvin & Casler Mfg. Co., Canastota, N. Y.
Matthews, H. A., Mfg. Co., Seymour, Ct.
Oliver, W. W., Mfg. Company, Buffalo, N. Y.
Peoria Machine & Supply Co., Peoria, Ill.
Pryibil, P., Machine Co., New York City.
Racine Sattley Factories, Springfield, Ill.
Riverside Machine Co., Chester, Pa.
Ruggles Machine Co., Poultney, Vt.
Rupp Mfg. Co., Inc., Hagerstown, Md.
Schoenert, Carl, & Sons, Newark, N. J.
Scott-Fetzer Machine Co., Cleveland, O.
Sears-Cross Co., Bush Terminal No. 20, Brooklyn, N. Y.

Smith, Jos. N., & Co., Detroit, Mich.
Smith, Samuel, Machine Co., Lawrence, Mass.
Standard Machine Co., Cleveland, O.
Stecher, Charles, Co., Chicago, Ill.
Steele & Condict, Inc., Jersey City, N. J.
Stowell Co., South Milwaukee, Wis.
Straight Line Engine Co., Syracuse, N. Y.
Stratton & Bragg Co., Petersburg, Va.
Sundstrom Manufacturing Company, Chicago, Ill.
Turner Machine Co., Danbury, Ct.
United Machine Works, 55-57 W. 3d St., N. Y.
Universal Mfg. Co., Milwaukee, Wis.
Washburn & Granger, Inc., 50 Church St., N. Y. City.
Will-Burt Co., Orrville, O.
Woodard Machine Co., Wooster, O.
Worcester Machine Works, Worcester, Mass.
Youngstown City Forge Co., Youngstown, O.
Zacharias, Edwin H., Reading, Pa.
Zelnicker, Walter A., Supply Co., St. Louis, Mo.
Zieg, F. B., Mfg. Company, Fredericktown, O.

MACHINERY DEALERS
Badger-Packard Machry. Co., Milwaukee, Wis.
Baird, W. J., Machry., Detroit, Mich.
Bath, Cyril J., & Co., Cleveland, O.
Bertolette Machine Tool Co., Jersey City, N. J.
Biggs Watterson Co., Cleveland, O.
Braudy, M., & Sons, Grand Rapids, Mich.
Broadway Machinery Co., Cincinnati, O.
Brownell Machinery Co., Providence, R. I.
Calleson, C. A., 50 Church St., New York City.
Carpenter & Woodward, Inc., Woolworth Bldg., N. Y. City.
Central Machinery & Supply Co., Cleveland, O.
Clarke, George W., Company, 149 Broadway, N. Y.
Cullen, C. W., Machry. Co., Cleveland, O.
Day Machinery Company, Buffalo, N. Y.
Eastern Machinery & Equipment Co., Philadelphia, Pa.
Essley, E. L., Machinery Co., Chicago, Ill.
Failor-Martin Corporation, 1689 Woolworth Bldg., New York City.
Federal Export Corp., 42 Broadway, New York, N. Y.
Federal Machry. Sales Co., Chicago, Ill.
Foss, Geo. F., Mach. & Supply Co., Montreal, Canada.
Graves Machinery Exchange, 50 Church St., N. Y. C.
Harris Bros. Co., Chicago, Ill.
Hill, Clarke & Co., Inc., Boston, Mass.
Hill, Clarke & Co. of Chicago, Chicago, Ill.
Hitner's, Henry A., Sons Co., Philadelphia, Pa.
Hollander Machinery Co., 3 Howard St., N. Y. City.
Hunt, J. M., Philadelphia, Pa.
Laird Machinery Company, Buffalo, N. Y.
Lucas, J. L., & Son, Inc., Bridgeport, Ct.
Lynd-Farquhar Company, Boston, Mass.
McMullen Machinery Co., Grand Rapids, Mich.
Manning, Maxwell & Moore, Inc., 119 West 40th St., N. Y. C.
Marshall & Huschart Machry. Co., Chicago, Ill.
Mitchell-Tappen Company, 15-17 John Street, New York City.
Modern Machry. Exchange, 52 Walker St., N. Y. C.
Morton Machinery Co., Philadelphia, Pa.
Motch & Merryweather Machinery Co., Cleveland, O.
New Jersey Machinery Exchange, Newark, N. J.
Nuttall, John, Philadelphia, Pa.
O'Brien Machry. Co., Philadelphia, Pa.
Osborne, D. M., Machinery Co., Cleveland, O.
Parmele, Charles L., 50 Church St., N. Y. City.
Pinner, R. A., 122 Water St., New York, N.Y.
Power Machinery Exchange, Inc., 1 Montgomery St., Jersey City, N. J.
Purinton & Smith Co., Hartford, Ct.
Prentiss, Henry, & Co., Inc., 149 Broadway, N. Y. C.
Quincy Sales Co., Inc., Boston, Mass.
Railway & Power Equipment Co., Woolworth Bldg., New York City.
Riverside Machry. Depot, Detroit, Mich.
Sachsenmaier, George, & Co., Philadelphia, Pa.
Saxer-Creider Machinery Co., Erie, Pa.
Simmons Machine Co., Inc., Albany, N. Y.
Smith, H. A., Machinery Co., Syracuse, N. Y.
Sterling Iron & Steel Company, Philadelphia, Pa.
Stickley, E. B., Machry. Co., Detroit, Mich.
Stocker-Rumely-Wachs Co., Chicago, Ill.
Stone, J. R., Tool & Supply Co., Detroit, Mich.
Strong, Homer, Rochester, N. Y.
Toomey, Frank, Philadelphia, Pa.
Wayne Machinery Co., Fort Wayne, Ind.
White, A. D., Machinery Co., Chicago, Ill.
Winterer, Herman L., Philadelphia, Pa.

MACHINISTS
Contracting
American Mach. & Fdry. Co., 5520 2d Ave., Brooklyn, N. Y.
Davies & Thomas Co., 120 Broadway, New York City.
Earle Gear & Mach. Co., Philadelphia, Pa.
Konigslow, Otto, Mfg. Co., Cleveland, O.

MACHINISTS' TOOLS AND SUPPLIES
(See Tools)

MAGNESITE
Dead Burnt
Scottish-Canadian Magnesite Co., Montreal, Que., Can.

MAGNETS
Lifting
Browning Co., Cleveland, O.
Electric Controller & Mfg. Co., Cleveland, O.

MANDRELS
Expanding
Jersey City Mach. Co., Jersey City, N. J.
Nicholson, W. H., & Co., Wilkes-Barre, Pa.
Western Tool & Mfg. Co., Springfield, O.

MANGANESE
Marshall, Edward E. Philadelphia, Pa.
Metal & Thermit Corp., 120 B'way, N. Y. City.

MANUFACTURING SITES
Poughkeepsie Chamber of Commerce, Poughkeepsie, N. Y.

MARKING DEVICES
Steel Stamping
Pannier Bros. Stamp Co., Pittsburgh, Pa.

MATS
Door, Flexible Steel
Cary Mfg. Co., Manhattan Bridge Plaza, Brooklyn, N. Y.
McKinney Mfg. Co., Pittsburgh, Pa.

METAL FORMING MACHINERY
Cold Roll
Yoder Company, Cleveland, O.

METALLINE
Metalline Company, Long Island City, N. Y.

METAL SPINNING
Baker-Manchester Mfg. Co., Providence, R. I.
Phillips, R. B., Mfg. Co., Worcester, Mass.

METAL
Bearings, Brass and Bronze
Ajax Metal Co., Philadelphia, Pa.
Bunting Brass & Bronze Co., Toledo, O.
Damascus Bronze Co., Pittsburgh, Pa.
Johnson Bronze Co., New Castle, Pa.
Syracuse Smelting Works, Brooklyn, N. Y.
Heat and Acid-Resisting
Bario Metal Corporation, 167 W. 18th Street, N. Y. C.
Thermostatic
General Electric Company, Schenectady, N. Y.

METALLOGRAPHIC APPARATUS
Holz, Herman A., 1 Madison Ave., N. Y.

METALLURGICAL APPARATUS
Scientific Materials Co., 717 Forbes St., Philadelphia, Pa.

MICROSCOPES
Jaeger, M., Cleveland, O.
Metallurgical
Holz, Herman A., 1 Madison Ave., N. Y.

MILLING MACHINE ACCESSORIES AND ATTACHMENTS
Detroit Stamping Co., Detroit, Mich.
Fox Machine Co., Jackson, Mich.
Garvin Mach. Co., 255 Spring, cor. Varick St., N. Y.
Kearney & Trecker Co., Milwaukee, Wis.

MILLING MACHINES
Automatic
Gooley & Edlund, Inc., Cortland, N. Y.
Hand
Fox Machine Co., Jackson, Mich.
Steptoe, John, Company, Cincinnati, O.
Whitney Mfg. Co., Hartford, Ct.
Horizontal
Cincinnati Milling Machine Co., Cincinnati, O.
Cleveland Milling Machine Co., Cleveland, O.
Fox Machine Co., Jackson, Mich.
Garvin Mach. Co., 255 Spring, cor. Varick St., N. Y.
Gooley & Edlund, Inc., Cortland, N. Y.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
McCabe, J. J., Lathe & Machinery Corporation, 149 Broadway, N. Y.
Universal Boring Mach. Co., Hudson, Mass.
Manufacturing
Fox Machine Co., Jackson, Mich.
Gooley & Edlund, Inc., Cortland, N. Y.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
McCabe, J. J., Lathe & Machinery Corporation, 149 Broadway, N. Y.
Moline Tool Company, Moline, Ill.
Plain
Bilton Machine Tool Co., Bridgeport, Ct.
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Milling Machine Co., Cincinnati, O.
Fox Machine Co., Jackson, Mich.
Garvin Mach. Co., 255 Spring, cor. Varick St., N. Y.
Gooley & Edlund, Inc., Cortland, N. Y.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
McCabe, J. J., Lathe & Machinery Corporation, 149 Broadway, N. Y.
Steptoe, John, Company, Cincinnati, O.
Second-hand
Harris Bros. Co., Chicago, Ill.
McCabe, J. J., Lathe & Machinery Corporation, 149 Broadway, N. Y.
Thread
Taft-Peirce Mfg. Company, Woonsocket, R. I.
Universal
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Milling Machine Co., Cleveland, O.
Fox Machine Co., Jackson, Mich.
Garvin Mach. Co., 255 Spring, cor. Varick St., N. Y.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
McCabe, J. J., Lathe & Machinery Corporation, 149 Broadway, N. Y.
Newton Machine Tool Works, Philadelphia, Pa.
Vertical
Cincinnati Milling Machine Co., Cincinnati, O.
Cleveland Milling Machine Co., Cleveland, O.
Garvin Mach. Co., 255 Spring, cor. Varick St., N. Y.
Kearney & Trecker Co., Milwaukee, Wis.
McCabe, J. J. Lathe & Machinery Corporation, 149 Broadway, N. Y.
Manning, Maxwell & Moore, Inc., 119 W. 40th St., N. Y.
Prentiss, Henry, & Co., Inc., 149 Broadway, N. Y.

MILLS
Wire Flattening
Blake & Johnson Co., Waterbury, Ct.
Torrington Mfg. Co., Torrington, Ct.

MIXING MACHINES
Concrete
Blaw-Knox Co., Pittsburgh, Pa.
Lakewood Eng. Co., Cleveland, O.
Smith, T. L., Company, Milwaukee, Wis.
Sand
National Engineering Company, Chicago, Ill.
Sand Mixing Machine Co., 52 Vanderbilt Avenue, N. Y. C.
Standard Sand & Machine Co., Cleveland, O.
Sand and Ore
Lakewood Equipment Co., Bucyrus, O.

MOLDING MACHINES
Core
Grimes Molding Mch. Co., Detroit, Mich.
Mumford Molding Machine Co., 1761 Elston Ave., Chicago, Ill.
Pridmore, Henry E., 19th and Rockwell Sts., Chicago, Ill.
Jarring (Air)
Grimes Molding Mch. Co., Detroit, Mich.
Mumford Molding Machine Co., 1761 Elston Ave., Chicago, Ill.
Nicholls, Wm. H., & Co., Inc., 2 College Place, Brooklyn, N. Y.
Jarring (Electric)
Mumford Molding Machine Co., 1761 Elston Ave., Chicago, Ill.
Pridmore, Henry E., 19th and Rockwell Sts., Chicago, Ill.
Hand and Power Operated
Grimes Molding Mch. Co., Detroit, Mich.
Rockover
Pridmore, Henry E., 19th and Rockwell Sts., Chicago, Ill.
Squeezer (Hand and Power)
Mumford Molding Machine Co., 1761 Elston Ave., Chicago, Ill.
Pridmore, Henry E., 19th and Rockwell Sts., Chicago, Ill.
Stripping Plate
Nicholls, Wm. H., & Co., Inc., 2 College Place, Brooklyn, N. Y.
Pridmore, Henry E., 19th and Rockwell Sts., Chicago, Ill.

MOLDINGS
Wrought Iron
Blum, Julius, & Co., 510 W. 24th St., N. Y.

MOLYBDENUM
Metal & Thermit Corp., 120 B'way, N. Y. City.
Primos Chemical Co., Primos, Pa.

MONEL METAL
Electrical Alloy Co., 135 Broadway, N. Y. C.
International Nickel Co., 43 Exchange Place, N. Y.

MOTORS
Electric
C. & C. Electric & Mfg. Co., Garwood, N. J.
Crocker-Wheeler Co., Ampere, N. J.
Electro Dynamic Co., Bayonne, N. J.
General Electric Company, Schenectady, N. Y.
Klein, Nathan, & Co., Inc., 208 Centre St., New York City.
Reliance Electric & Engineering Co., Cleveland, O.
Ridlon, Frank, Co., Boston, Mass.
Vonnegut Machry. Co., Indianapolis, Ind.
Electric, Second Hand
Archer & Baldwin, Inc., 114 Liberty St., N. Y.
Bender, Geo., 122-130 Centre St., N. Y. C.
Duquesne Electric & Mfg. Co., Pittsburgh, Pa.
Gregory Electric Co., Chicago, Ill.
Harris Bros. Co., Chicago, Ill.
Klein, Nathan, & Co., Inc., 208 Centre St., New York City.
McCoy-Brandt Machinery Co., Pittsburgh, Pa.
MacGovern & Co., Inc., 114 Liberty St., N. Y. C.
Machinery Utilities Co., Inc., 501 Fifth Ave., N. Y. C.
Miller-Owen Electric Co., Pittsburgh, Pa.
Obrien Machy. Co., Philadelphia, Pa.
Power Machinery Exchange, Inc., 1 Montgomery St., Jersey City, N. J.
Ridlon, Frank, Co., Boston, Mass.
Sachsenmaier, George, & Co., Philadelphia, Pa.
Wilson, H. R., Machinery Co., St. Louis, Mo.

MOTORS AND GENERATORS
Electric
Fairbanks, Morse & Company, 30 Church St., N. Y. C.

NAILS
Cement Coated
American Steel Co., Pittsburgh, Pa.
Larkin, J. K., & Co., 34 Reade St., N. Y. City.
Midvale Steel & Ordnance Co., Philadelphia, Pa.
National Lock Company, Rockford, Ill.
Copper
American Steel & Wire Co., Chicago, Ill.
Stimpson, Edwin B., Company, 70 Franklin Ave., Brooklyn, N. Y.
Cut
Larkin, J. K., & Co., 34 Reade St., N. Y. City.
Upholsterers
Mattatuck Mfg. Co., Waterbury, Ct.
Wire
American Steel Co., Pittsburgh, Pa.
American Steel & Wire Co., Chicago, Ill.
Grant, Robert, Woolworth Bldg., N. Y. City.
Gulf States Steel Co., Birmingham, Ala.
Interstate Iron & Steel Co., Chicago, Ill.
Larkin, J. K., & Co., 34 Reade St., N. Y. C.
Morgan Spring Co., Worcester, Mass.
National Lock Company, Rockford, Ill.
Townsend Co., New Brighton, Pa.
Wickwire Bros., Inc., Cortland, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

NAME PLATES
Crowe Name Plate & Engraving Co., Chicago, Ill.

NETTING
Wire, Poultry
American Steel & Wire Co., Chicago, Ill.
New Jersey Wire Cloth Co., Trenton, N. J.
Wickwire Bros., Inc., Cortland, N. Y.

NICKEL
Electrical Alloy Co., 135 Broadway, New York.
International Nickel Co., 43 Exchange Pl., N. Y.
Boronic-Alloying (Shot)
American Boron Products Company, Reading, Pa.

NICKEL ANODES
Rolled
Seymour Mfg. Co., Seymour, Ct.

NICKEL SILVER
Electrical Alloy Co., 135 Broadway, N. Y. C.
Seymour Mfg. Co., Seymour, Ct.
Stamford Rolling Mills Co., Springdale, Ct.

NOVELTIES
Metal
Autoyre Co., Oakville, Ct.
Bates, W. E., Mfg. Works, Waterbury, Ct.

NUT MACHINES
Howard Iron Works, Buffalo, N. Y.
National Mchry. Co., Tiffin, O.

NUTS
Castellated
Cincinnati Screw Co., Twightwee, O.
Federal Nut, Bolt & Machine Co., Cleveland, O.
Western Screw Products Co., St. Louis, Mo.
Cold Punched
American Equipment Co., Norristown, Pa.
Garland Nut & Rivet Co., West Pittsburgh, Pa.
Larkin, J. K. & Co., 34 Reade St., N. Y. C.
Milton Mfg. Co., Milton, Pa.
National Screw & Tack Co., Cleveland, O.
Hot Pressed
American Equipment Co., Norristown, Pa.
Larkin, J. K., & Co., 34 Reade St., N. Y. C.
Milton Mfg. Co., Milton, Pa.
St. Louis Screw Co., St. Louis, Mo.
Lock
Drake Lock-Nut Co., San Francisco, Cal.
Machine Screw
Drake Lock-Nut Co., San Francisco, Cal.
National Screw & Tack Co., Cleveland, O.
Thumb, Malleable
National Screw & Tack Co., Cleveland, O.
St. Louis Screw Co., St. Louis, Mo.
Western Automatic Machine Screw Co., Elyria, O.

OIL STONES
Norton Co., Worcester, Mass.

OIL STORAGE SYSTEMS
Gilbert & Barker Mfg. Co., Springfield, Mass.

OILERS
Shafting
Nugent, Wm. W., & Co., Inc., Chicago, Ill.
Sight Feed
Michighn Lubricator Company, Detroit, Mich.

OILING DEVICES
Nugent, Wm. W., & Co., Inc., Chicago, Ill.

OILING SYSTEMS
Nugent, Wm. W., & Co., Inc., Chicago, Ill.

OILS
Core
Cataract Refining & Mfg. Co., Buffalo, N. Y.
Smith, Werner G., Co., Cleveland, O.
Cutting
Cataract Refining & Mfg. Co., Buffalo, N. Y.
Damascus Mfg. Co., Cleveland, O.
Fiske Bros. Refining Co., 24 State St., New York City.
Lubricating
Damascus Mfg. Co., Cleveland, O.
Soluble
Fiske Bros., Refining Co., 24 State St., N.Y.C.

OVENS
Baking
Moyer, Albert W., Singer Bldg., New York City.
Oven Equipment & Mfg. Co., New Haven, Ct.
Roberts Portable Oven Co., Chicago, Ill.
Young Bros. Co., Detroit, Mich.
Coke and By-Products Recovery
Koppers, H., Co., Pittsburgh, Pa.
Core
Moyer, Albert W., Singer Bldg., New York City.
Oven Equipment & Mfg. Co., New Haven, Ct.
Sly, W. W., Mfg. Company, Cleveland, O.
Whiting Foundry Equipment Co., Harvey, Ill.
Young Bros. Co., Detroit, Mich.
Cross Regenerative
Koppers, H., Co., Pittsburgh, Pa.
Drying
Moyer, Albert W., Singer Bldg., New York City.
Young Bros. Co., Detroit, Mich.
Enameling and Japanning
Gehnrich Indirect Heat Oven Co., Inc., 62 Franklin Ave., Brooklyn, N. Y.
Moyer, Albert W., Singer Bldg., New York City.
Oven Equipment & Mfg. Co., New Haven, Ct.
Roberts Portable Oven Co., Chicago, Ill.
Steiner, Emil F., Newark, N. J.
Young Bros. Co., Detroit, Mich.
Lacquering
Gehnrich Indirect Heat Oven Co., Inc., 62 Franklin Ave., Brooklyn, N. Y.
Roberts Portable Oven Co., Chicago, Ill.
Young Bros. Co., Detroit, Mich.

OXY-ACETYLENE WELDING & CUTTING EQUIPMENT AND SUPPLIES
Davis-Bournonville Co., Jersey City, N. J.
Linde Air Products Co., 42nd Street Building, New York.
Messer Mfg. Co., Philadelphia, Pa.
Milburn, Alexander, Co., Baltimore, Md.

OXYGEN
International Oxygen Company, 115 B'way, N. Y. C.
Linde Air Products Co., 42nd Street Building, New York.

PACKING
Asbestos and Rubber
Goodrich, B. F., Co., Akron, O.
New York Belting & Packing Co., 91-93 Chambers St., N. Y.
Felt
Booth Felt Co., Inc., 440 19th St., Brooklyn.
Iron
Smooth-On Mfg. Co., Jersey City, N. J.
Leather
Southwark Fdry. & Mch. Co., Philadelphia, Pa.
Watson-Stillman Co., 190 Fulton St., N. Y.

PAINTS
Machinery
Moller & Schumann Co., Marcy & Flushing Aves., Brooklyn, N. Y.
Metal
Dixon, Jos., Crucible Co., Jersey City, N. J.

PANELS
Protection
Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa.

PARTITIONS
Interior Wire
Anchor Post Iron Works, 23 Cortlandt St., N. Y. C.
Swett & Sibley Co., Boston, Mass.

PATENT ATTORNEYS
Alexander & Dowell, Washington, D. C.

PATTERN LETTERS
Cleveland Galvanizing Works, Cleveland, O.

PATTERNS
Wood and Metal
Barnum, S. H., New Haven, Ct.
Berks Engineering Co., Reading, Pa.
Davenport, John, Company, Stamford, Ct.
General Machine & Tool Works, Mason City, Iowa.
Keystone Pattern Works, Pittsburgh, Pa.
Marion Malleable Iron Wks., Marion, Ind.
S-P Mfg. Co., Cleveland, O.
Standard Pattern Works, York, Pa.
Teuscher & Son Machinery Supply Company, St. Louis, Mo.
Wellman Products Co., Cleveland, O.
Western Foundry & Machine Co., Moline, Ill.

PERFORATED METAL
Chicago Perforating Co., Chicago, Ill.
Cross Engineering Co., Carbondale, Pa.
Erdle Perforating Co., Rochester, N. Y.
Harrington & King Perforating Co., Chicago.
Hendrick Mfg. Co., Carbondale, Pa.
Mundt, Chas., & Sons, Jersey City, N. J.

PHOSPHOR BRONZE
Ajax Metal Co., Philadelphia, Pa.
Bunting Brass & Bronze Co., Toledo, O.
Damascus Bronze Co., Pittsburgh, Pa.
Johnson Bronze Co., New Castle, Pa.
Phosphor-Bronze Smelting Co., Phila., Pa.
Seymour Mfg. Co., Seymour, Ct.
Wellman Bronze Co., Cleveland, O.

PHOSPHOR COPPER
Syracuse Smelting Works, Brooklyn, N. Y.

PHOSPHOR TIN
Empire Metal Co., Syracuse, N. Y.
Syracuse Smelting Works, Brooklyn, N. Y.

PHOSPHORIZERS
McCullough-Dalzell Crucible Co., Pittsburgh.

PIG IRON
Addy, Matthew, Co., Cincinnati, O.
Bethlehem Steel Co., So. Bethlehem, Pa.
Central Iron & Steel Co., Harrisburg, Pa.
Grant, Robert, Woolworth Bldg., N. Y. City.
Hanna, M. A., & Co., Cleveland, O.
Illinois Steel Co., Chicago, Ill.
McKeefrey & Co., Leetonia, O.
Matlock Coal & Iron Corporation, New York City.
Mohr, J. J., & Son, Philadelphia, Pa.
Mudge, E. W., & Co., Pittsburgh, Pa.
Republic Iron & Steel Co., Youngstown, O.
Rogers, Brown & Co., Cincinnati, O.
Samuel, Frank, Philadelphia, Pa.
Snyder, W. P., & Co., Pittsburgh, Pa.
Stewart Iron Co., Ltd., Cleveland, O.
Struthers Furnace Co., Cleveland, O.
Tenn. Coal, Iron & R. R. Co., Birmingham, Ala.
Wharton Steel Co., Wharton, N. J.
Wickwire Steel Co., Buffalo, N. Y.
Charcoal
Superior Charcoal Iron Co., Grand Rapids, Mich.

PILE DRIVERS
Vulcan Iron Works, Chicago, Ill.

PILE SHOES
Janney, Steinmetz & Co., Philadelphia, Pa.
Larkin, J. K., & Co., 34 Reade St., N. Y. City.
Vulcan Iron Works, Chicago, Ill.

PILING
Sheet Steel
Carnegie Steel Co., Pittsburgh, Pa.
Lackawanna Steel Co., 2 Rector St., N. Y.

PILING MACHINE
Revolvator Co., Jersey City, N. J.
Portable
Portable Machinery Co., Passaic, N. J.

PINIONS
Non-Metallic
Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa.
Raw Hide
New Process Gear Co., Syracuse, N. Y.
Van Dorn & Dutton Co., Cleveland, O.

PINS
Escutcheon
Hassall, John, Inc Clay & Oakland St., Brooklyn, N. Y.
Taper
Worcester Mach. Screw Co., Worcester, Mass.

PIPE
Bent
Republic Iron & Steel Co., Youngstown, O.
Standard Tool & Mfg. Co., Detroit, Mich.
Cast Iron, B. & S. and Flanged
American Cast Iron Pipe Co., Birmingham, Ala.
American Steel Export Co., Woolworth Bldg., New York City.
Cast Iron Pipe Publicity Bureau, 1 Broadway, N. Y.
U. S. Cast Iron Pipe & Fdry. Co., Burlington, N. J.
Warren Fdry. & Mach. Co., 11 Broadway, New York.
Wood, R. D., & Co., Philadelphia, Pa.
Lap-welded Steel
American Spiral Pipe Works, Chicago, Ill.
Grant, Robert, Woolworth Bldg., N. Y. City.
La Belle Iron Works, Steubenville, O.
Larkin, J. K., & Co., 34 Reade St., N. Y. City.
National Tube Co., Pittsburgh, Pa.
Youngstown Sheet & Tube Co., Youngstown, O.
New and Second-hand
Albert & Davidson, Inc., Brooklyn, N. Y.
Eagle Pipe Supply Co., 30 Church St., N. Y.
Griffith, James F., Philadelphia, Pa.
Illinois Pipe & Mfg. Co., Chicago, Ill.
McDowell & Co., Pittsburgh, Pa.
Pipe & Contractors' Supply Co., 3 Dover St., N. Y.
Rolfe Iron Company, Chicago, Ill.
United States Column Co., Cambridge, Mass.
Riveted Steel
American Spiral Pipe Wks., Chicago, Ill.
Keeler, E., Co., Williamsport, Pa.
Standard Spiral Pipe Works, Chicago, Ill.
Sheet Metal
Standard Spiral Pipe Works, Chicago, Ill.
Water and Steam
Larkin, J. K., & Co., 34 Reade St., N. Y. City.
National Tube Co., Pittsburgh, Pa.
Standard Spiral Pipe Works, Chicago, Ill.
Youngstown Sheet & Tube Co., Youngstown, O.
Wrought Iron
Byers, A. M., Co., Pittsburgh, Pa.
Central Tube Co., Pittsburgh, Pa.
Harrisburg Pipe & Pipe Bending Co., Harrisburg, Pa.
La Belle Iron Works, Steubenville, O.
Larkin, J. K., & Co., 34 Reade St., N. Y. City.
Reading Iron Co., Reading, Pa.
Youngstown Sheet & Tube Co., Youngstown, O.

PIPE CUTTING AND THREADING MACHINES
Bignall & Keeler Mach. Works, Edwardsville, Ill.
Curtis & Curtis Co., Bridgeport, Conn.
Jarecki Mfg. Co., Erie, Pa.
Landis Mch. Co., Waynesboro, Pa.
Merrell Mfg. Co., Toledo, O.
Saunders' Sons, D., Yonkers, N. Y.
Standard Engineering Co., Ellwood City, Pa.
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.
Treadwell Engineering Co., Easton, Pa.

PIPE FITTINGS
Jarecki Mfg. Co., Erie, Pa.
Larkin, J. K., & Co., 34 Reade St., N. Y. City.
Lunkenheimer Co., Cincinnati, O.
Malleable Iron Fittings Co., Branford, Ct.
Pittsburgh Piping & Equip. Co., Pittsburgh, Pa.
Pittsburgh Valve, Fdy. & Construction Co., Pittsburgh, Pa.
U. S. Cast Iron Pipe Fdry. Co., Burlington, N. J.
Walworth Mfg. Co., Boston, Mass.

PIPING CONTRACTORS
Pittsburgh Piping & Equip. Co., Pittsburgh, Pa.
Pittsburgh Valve, Fdy. & Construction Co., Pittsburgh, Pa.

PLANING MACHINES
Metal
American Tool Works, Cincinnati, O.
Cincinnati Planer Co., Cincinnati, O.
Cincinnati Shaper Co., Cincinnati, O.
Cleveland Punch & Shear Wks. Co., Cleveland, O.
Conradson, C. M., Green Bay, Wis.
Detrick & Harvey Mach. Co., Baltimore, Md.
Hamilton Mach. Tool Co., Hamilton, O.
Hilles & Jones Co., Wilmington, Del.
Liberty Machine Tool Co., Hamilton, O.
McCabe, J. J., Lathe & Machinery Corporation, 149 Broadway, N. Y.
Manning, Maxwell & Moore, Inc., 119 W. 40th St., N. Y.
Newton Machine Tool Works, Philadelphia, Pa.
Ohio Machine Tool Co., Kenton, O.
Whitcomb-Blaisdell Mch. Tool Co., Worcester, Mass.
Wilson, W. A., Mach. Co., Rochester, N. Y.
Second-Hand
Bertolette Machine Tool Company, Jersey City, N. J.

PLATES
Cellar Door and Floor
American Pressed Steel Co., Philadelphia, Pa.
Electric Hot
Engelhard, Chas., 30 Church St., N. Y. C.
Felloe
Wrought Washer Mfg. Co., Milwaukee, Wis.
Iron and Steel
Allegheny Steel Co., Brackenridge, Pa.
American Pressed Steel Co., Philadelphia, Pa.
Baily & Allen Co., Chicago, Ill.
Carnegie Steel Co., Pittsburgh, Pa.
Central Iron & Steel Co., Harrisburg, Pa.
Donner Steel Company, Buffalo, New York.
Eastern Export Co., 30 Church St., N. Y. C.
Grant, Robert, Woolworth Bldg., N. Y. City.
Hoffman, R. C., & Co., Baltimore, Md.
Illinois Steel Co., Chicago, Ill.
Jones & Laughlin Steel Co., Pittsburgh, Pa.
La Belle Iron Works, Steubenville, O.
Lackawanna Steel Co., 2 Rector St., N. Y.
Latshaw Steel & Metal Products Corp., 220 Broadway, N. Y. City.
Lindsay, James G., & Co., Philadelphia, Pa.
Lukens Steel Co., Coatesville, Pa.
Midvale Steel & Ordnance Co., Philadelphia, Pa.
Moltrup Steel Products Co., Beaver Falls, Pa.
Nagle Steel Co., Pottstown, Pa.
Otis Steel Co., Cleveland, O.
Shippers' Car Line, 165 Broadway, N. Y.

Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.
Wood, Alan, Iron & Steel Co., Phila., Pa.

Match
Atkins, E. C., & Co., Inc., Indianapolis, Ind.

PLATERS' CLEANING COMPOUND
Oakley Chemical Co., 22 Thames St., New York City.

PLATING

Brass, Copper and Nickel
Keystone Screw Co., Philadelphia, Pa.
Universal Chain Co., Stroudsburg, Pa.

Electro Lead
U. S. Electro Lead Plating Co., Cleveland, O.

Tin
Rollman Manufacturing Co., Mount Joy, Pa.

PLUGS

Core Hole
Hubbard Spring Works, Pontiac, Mich.

PLUMBAGO
Smith, Werner G., Co., Cleveland, O.

PNEUMATIC TOOLS
Chicago Pneumatic Tool Co., Chicago, Ill.
Cleveland Pneumatic Tool Co., Cleveland, O.
Independent Pneumatic Tool Co., Chicago, Ill.
Ingersoll-Rand Co., 11 B'way, N. Y.
Oldham, Geo., & Son Co., Philadelphia, Pa.

POSTS

Steel Fence
American Steel & Wire Co., Chicago, Ill.

POTS

Chemical
Valley Iron Works, Williamsport, Pa.

POWDERED COAL PLANTS

Complete
Bonnot Co., Canton, O.
Fuller Engineering Co., Allentown, O.
Locomotive Pulverized Fuel Co., 30 Church St., N. Y. C.
Metals Production Equipment Co., 165 Broadway, N. Y. C.
Quigley Furnace Specialties Co., 26 Cortlandt St., New York City.

POWER TRANSMITTING MACHINERY
American Pulley Co., Philadelphia, Pa.
Bond Fdry. & Mach. Co., Manheim, Pa.
Brown, A. & F., Co., 79 Barclay St., N. Y.
Caldwell, H. W., & Son Co., Chicago, Ill.
Caldwell, W. E., Co., 260 Brandeis St., Louisville, Ky.
Cresson-Morris Co., Philadelphia, Pa.
Falk, The, Co., Milwaukee, Wis.
Falls Clutch & Machinery Co., Cuyahoga Falls, O.
Hess-Snyder Co., Massillon, O.
Jeffrey Mfg. Company, 925 N. 4th St., Columbus, O.
Johnson, Carlyle, Machine Co., Manchester, Ct.
Moore & White Co., Philadelphia, Pa.
Norwalk Iron Works Co., So. Norwalk, Ct.
Woods, T. B., Sons Co., Chambersburg, Pa.

PRESSES

Briquetting
General Briquetting Co., 41 Broad St., N.Y.C.

Drop
Bliss, E. W., Co., 11 Adams St., Brooklyn, N. Y.
Miner & Peck Mfg. Co., New Haven, Ct.
United Engineering & Foundry Co., Pittsburgh.

Foot
Shuster, F. B., Co., New Haven, Ct.
Taylor & Fenn Co., Hartford, Ct.

Forging
American Equipment Co., Bucyrus, O.
Camden Iron Works, Camden, N. J.
Consolidated Press Co., Hastings, Mich.
Morgan Engineering Co., Alliance, O.
Southwark Fdry. & Mch. Co., Philadelphia, Pa.
Toledo Mach. & Tool Co., Toledo, O.
United Engineering & Foundry Co., Pittsburgh.
Watson-Stillman Co., 190 Fulton St., N. Y.

Hydraulic
Dudgeon, Richard, Broome & Columbia Sts., N. Y.
Elmes, Chas. F., Engineering Works, Chicago.
Hydraulic Press Mfg. Co., Mount Gilead, O.

Measuring
Gilbert & Barker Mfg. Co., Springfield, Mass.
Mesta Machine Co., Pittsburgh, Pa.
Metalwood Mfg. Co., Detroit, Mich.
Morgan Engineering Co., Alliance, O.
Southwark Foundry & Mch. Co., Philadelphia, Pa.
United Engineering & Foundry Co., Pittsburgh, Pa.
Watson-Stillman Co., 190 Fulton St., N. Y.

Hydraulic, Portable
Southwark Fdry. & Mch. Co., Philadelphia, Pa.
Vulcan Iron Works, Chicago, Ill.

Oily Waste
Nugent, Wm. W., & Co., Inc., Chicago, Ill.

Power
Adriance Machine Works, Inc., 253 Van Brunt St., Brooklyn, N. Y.
Baird Machine Co., Bridgeport, Ct.
Beatty Machine & Mfg. Co., Hammond, Ind.
Bliss, E. W., Co., 11 Adams St., Brooklyn, N. Y.
Consolidated Press Co., Hastings, Mich.
Ferracute Machine Co., Bridgeton, N. J.
Henderson Machine Co., Philadelphia, Pa.
Leffler, Chas., & Co., 61 Clymer St., Brooklyn, N. Y.
Loy & Nawman Co., Newark, N. J.
Mains Engineering Company, Philadelphia, Pa.
Manville, E. J., Mach. Co., Waterbury, Ct.
Massillon Foundry & Machine Co., Massillon, O.
Niagara Machine & Tool Works, Buffalo, N. Y.
Rockford Iron Works, Rockford, Ill.
Stoll, D. H., Co., Buffalo, N. Y.
Streine Tool & Mfg. Co., New Bremen, O.
Toledo Mach. & Tool Works, Toledo, O.
United Engineering & Foundry Co., Pittsburgh, Pa.
V & O Press Co., Brooklyn, N. Y.
Verdin, Kappes & Verdin Co., Cincinnati, O.
Zeh & Hahnemann Co., Newark, N. J.

Power Forcing
Lucas Mach. Tool Co., Cleveland, O.

Scrap Bundling
Chicago Baling Press Co., Chicago, Ill.
Southwark Fdry. & Mch. Co., Philadelphia, Pa.
Watson-Stillman Co., 190 Fulton St., N. Y.

Screw
Consolidated Press Co., Hastings, Mich.
Manhattan Mach. & Tool Works, Grand Rapids, Mich.

Wiring and Horning
Consolidated Press Co., Hastings, Mich.

PULLEYS

Friction Clutch
Caldwell, W. E., Co., 260 Brandeis St., Louisville, Ky.
Moore & White Co., Philadelphia, Pa.

Iron and Wood, Solid and Split
Abell-Howe Co., Chicago, Ill.
Eastern Machinery Co., New Haven, Ct.
Hess-Snyder Co., Massillon, O.

Iron, Solid and Split
Bond Fdry. & Mach. Co., Manheim, Pa.
Caldwell, W. E., Co., 260 Brandeis St., Louisville, Ky.
Woods, T. B., Sons Co., Chambersburg, Pa.

Steel
Abell-Howe Co., Chicago, Ill.

Steel Rim Solid and Split
American Pulley Co., Philadelphia, Pa.

PULVERIZERS

Coal
Bonnot Co., Canton, O.
Fuller-Lehigh Co., Fullerton, Pa.
Raymond Bros. Impact Pulverizer Co., Chicago, Ill.

PUMPING MACHINERY
Cincinnati Pulley Mach. Co., Covington, Ky.
Dean Bros. Steam Pump Works, Indianapolis, Ind.
Deming Co., The, Salem, O.
Lea-Courtney Co., Newark, N. J.
Myers, F. E., & Bro., Ashland, O.
Wood, R. D., & Co., Philadelphia, Pa.

PUMPS

Acid Proof
Lucas-Miner Pump Co., Dayton, O.

Air
Worthington Pump & Machinery Corp., 115 Broadway, New York City.

Boiler Feed
Dean Bros. Steam Pump Works, Indianapolis, Ind.
Goulds Mfg. Co., Seneca Falls, N. Y.
Lea-Courtenay Co., Newark, N. Y.
Worthington Pump & Machinery Corp., 115 Broadway, New York City.

Centrifugal
Alberger Pump & Condenser Co., 150 Cedar St., New York City.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Well Wks., Aurora, Ill.
Cameron, A. S., Steam Pump Wks., 11 Broadway, N. Y.
De Laval Steam Turbine Co., Trenton, N. J.
Frederick Iron & Steel Co., Frederick, Md.
Hart Trading Co., Tribune Bldg., New York City, N. Y.
Lea-Courtenay Co., Newark, N. J.
Terry Steam Turbine Co., Hartford, Ct.
Worthington Pump & Machinery Corp., 115 Broadway, New York City.

Electric
American Well Works, Aurora, Ill.
Boyts, Porter & Co., Connellsville, Pa.
Cameron, A. S., Steam Pump Wks., 11 Broadway, N. Y.
Deming Co., Salem, O.
Lea-Courtenay Co., Newark, N. J.
Lucas-Milner Pump Co., Dayton, O.
Myers, F. E., & Bro., Ashland, O.
Worthington Pump & Machinery Corp., 115 Broadway, New York City.

Force and Lift
Myers, F. E., & Bro., Ashland, O.
Trahern Pump Co., Rockford, Ill.

Hydraulic
Deming Co., Salem, O.
Elmes, Chas. F., Engineering Wks., Chicago.
Hydraulic Press Mfg. Co., Mount Gilead, O.
Southwark Fdry. & Mch. Co., Philadelphia, Pa.
Watson-Stillman Co., 120 Fulton St., N. Y.

Lubricating for Water and Oil
Lea-Courtenay Co., Newark, N. J.
Trahern Pump Co., Rockford, Ill.

Oil
Gilbert & Barker Mfg. Co., Springfield, Mass.
Nugent, Wm. W., & Co., Inc., Chicago, Ill.
Worthington Pump & Machinery Corp., 115 Broadway, New York City.

Rotary
Trahern Pump Co., Rockford, Ill.
Webster & Perks Tool Co., Springfield, O.

Steam
American Well Works, Aurora, Ill.
Boyts, Porter & Co., Connellsville, Pa.
Cameron, A. S., Steam Pump Wks., 11 Broadway, N. Y.
Fairbanks, Morse & Company, 30 Church St., N. Y. C.
Hart Trading Co., Tribune Bldg., New York City, N. Y.
National Transit Pump & Mach. Co., Oil City, Pa.
Worthington Pump & Machinery Corp., 115 Broadway, New York City.

Suction
Lea-Courtenay Co., Newark, N. J.

Vacuum
Cameron, A. S., Steam Pump Wks., 11 Broadway, N. Y.
Nagle Corliss Engine Works, Erie, Pa.
Worthington Pump & Machinery Corp., 115 Broadway, New York City.

PUNCH AND DIE WORK
International Metal Mfg. Co., Wayne Junction, Philadelphia, Pa.
Quinsigamond Pressed Steel Co., Worcester, Mass.

PUNCHES AND DIES
Cleveland Punch & Shear Works Co., Cleveland, O.
Marchant, Geo. F., Co., Chicago, Ill.

PUNCHES

Hydraulic
Dudgeon, Richard, Broome & Columbia Sts., N. Y.

PUNCHING AND SHEARING MACHINES
Armstrong-Blum Mfg. Co., Chicago, Ill.
Beatty Machine & Mfg. Co., Hammond, Ind.
Cedar Rapids Fdry. & Mch. Co., Cedar Rapids, Ia.
Cleveland Punch & Shear Works Co., Cleveland, O.
Covington Mach. Co., Covington, Va.
Fallor-Martin Corporation, 1689 Woolworth Bldg., N. Y. City.
Harrington & King Perforating Co., Chicago.
Hilles & Jones Co., Wilmington, Del.
Lewis Foundry & Machine Co., Pittsburgh, Pa.
Long & Allstatter Co., Hamilton, O.
McCabe, J. J., Lathe & Machinery Corporation, 149 Broadway, N. Y.
Morgan Engineering Co., Alliance, O.
Niagara Machine & Tool Works, Buffalo, N. Y.
Royersford Foundry Machine Co., Royersford, Pa.
Southwark Fdry. & Mch. Co., Philadelphia, Pa.
Watson-Stillman Co., 190 Fulton St., N. Y.
Wickes Brothers, Saginaw, Mich.
Williams, White & Co., Moline, Ill.

PURCHASING AGENTS

Shipbuilding Material
Liberty Steel Products Co., Inc., Woolworth Bldg., New York City.

PYROMETERS
Bristol Co., Waterbury, Ct.
Brown Instrument Co., Philadelphia, Pa.
Engelhard, Chas., 30 Church St., N. Y.
Price Electric Co., The, Cleveland, O.
Scientific Materials Co., 717 Forbes St., Philadelphia, Pa.
Taylor Instrument Companies, Rochester, N. Y.
Thwing Instrument Co., Philadelphia, Pa.

QUARTZ

Glass
Engelhard, Chas., 30 Church St., N. Y.

RACKS

Machine Cut
Nuttall, R. D., Co., Pittsburgh, Pa.
Standard Gauge Steel Co., Beaver Falls, Pa.
Van Dorn & Dutton Co., Cleveland, O.

Steel and Iron Storage
Western Tool & Mfg. Co., Springfield, O.

RADIATORS

Heating and Cooling
Pressed Metal Radiator Co., Pittsburgh, Pa.

RAIL BONDS
American Steel & Wire Co., Chicago, Ill.

RAILS
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., Pittsburgh, Pa.
Chicago Rail & Equipment Co., Chicago, Ill.
Continental Iron & Steel Co., 2 Rector St., N. Y.
Coventry, Leroy, 200 West 72nd St., N. Y. City.
Derry, A. L., & Co., Scranton, Pa.
Donner Steel Company, Buffalo, New York.
Fishel & Marks, Cleveland, O.
Foster, H. M., Co., Baltimore, Md.
Foster, L. B., Co., Pittsburgh, Pa.
Frank, M. K., Pittsburgh, Pa.
Granville, Joseph D., Company, St. Louis, Mo.
Grant, Robert, Woolworth Bldg., N. Y. City.
Green, L. A., Rail & Machry. Co., Pittsburgh, Pa.
Hoffman, R. C., & Co., Baltimore, Md.
Illinois Steel Co., Chicago, Ill.
Joseph, Jos., & Bros. Co., Cincinnati, O.
Koppel, Orenstein-Arthur Co., Pittsburgh, Pa.
Lackawanna Steel Co., 2 Rector St., N. Y.
Mitshkun, M., Co., Detroit, Mich.
Richardson & Co., Inc., Pittsburgh, Pa.
Robinson & Orr, Pittsburgh, Pa.
Sherwood, E. C., 50 Church St., N. Y.
Steel Rail Supply Co., 2 Rector St., N. Y.
Tenn. Coal, Iron & R. R. Co., Birmingham, Ala.
U. S. Rail Co., Cumberland, Md.
Zelnicker, Walter A., Supply Co., St. Louis, Mo.

RAILWAY EQUIPMENT & SUPPLIES
Conard, Thos. P., Philadelphia, Pa.
Hoffman, R. C., & Co., Baltimore, Md.
Meyer, F., Chicago, Ill.
Mitshkun, M., Co., Detroit, Mich.
Pidgeon-Thomas Iron Co., Memphis, Tenn.
Shippers Car Line, 165 Broadway, N. Y.
U. S. Rail Co., Cumberland, Md.

RATCHET DRILLS
Armstrong Bros. Tool Co., Chicago, Ill.
Pratt & Whitney Co., Hartford, Ct.

REAMERS
Advance Tool Co., Cincinnati, O.
Alvord Reamer & Tool Co., Millersburg, Pa.
Brown-McClaren Mfg. Co., Detroit, Mich.
Brubaker, W. L., & Bros., Millersburg, Pa.

Cleveland Power Transmission Co., Cleveland.
Cleveland Punch & Shear Works Co., Cleveland, O.
Detroit Twist Drill Co., Detroit, Mich.
Greenfield Tap & Die Corp., Greenfield, Mass.
Jaeger, M., Cleveland, Ohio.
McCrosky Reamer Co., Meadville, Pa.
Mergenthaler Co., Baltimore, Md.
National Tool Co., Cleveland, O.
Pratt & Whitney Co., Hartford, Ct.
Reliance Steel & Tool Co., Inc., 24-26 Murray St., New York City.
Skelton Sales Co., Syracuse, N. Y.
Standard Tool Co., Cleveland, O.
Taft-Peirce Mfg. Company, Woonsocket, R. I.
Union Twist Drill Co., Athol, Mass.
Whitman & Barnes Mfg. Co., Akron, O.

RETORTS
Nitric Acid
Valley Iron Works, Williamsport, Pa.

RHEOSTATS
Electric Controller & Mfg. Co., Cleveland, O.

RIDDLES
Foundry
Worthington Pump & Machinery Corp., 115 Broadway, New York City.

RINGS
Hardened Tool Steel
Auburn Ball Bearing Co., Rochester, N. Y.
Wheelock Lovejoy & Co., 23 Cliff St., N. Y.
Iron and Steel
Akron-Selle Co., Akron, O.
Allison & Co., Chester, Pa.
Cann & Saul, Philadelphia, Pa.
Columbus McKinnon Chain Company, Columbus, O.
Crucible Steel Forge Co., Cleveland, O.
Standard Parts Co., Cleveland, O.
Standard Steel Works Co., Philadelphia, Pa.

RIVET CUTTING GUNS
Rivet Cutting Gun Company, Cincinnati, O.

RIVET MAKING MACHINERY
Acme Machinery Co., Cleveland, O.
Cook, Asa S., Hartford, Ct.
Manville, E. J., Mach. Co., Waterbury, Ct.
National Mchry. Co., Tiffin, O.

RIVET SETS AND STANDS
Cleveland Punch & Shear Wks. Co., Cleveland, O.
Marchant, Geo. F., Co., Chicago, Ill.

RIVETING MACHINES
Hanna Eng. Works, 1761 Elston Ave., Chicago, Ill.
Hilles & Jones Co., Wilmington, Del.
Shuster, F. B., Co., New Haven, Ct.
Electric
New England Machinery Co., New Haven, Ct.

RIVETS
American Equipment Co., Norristown, Pa.
American Screw Co., Providence, R. I.
Blake & Johnson Co., Waterville, Ct.
Burden Iron Co., Troy, N. Y.
Carlin, Anthony, Cleveland, O.
Clark Bros. Bolt Co., Milldale, Ct.
Cobb & Drew, Inc., Plymouth, Mass.
Garland Nut & Rivet Co., West Pittsburgh, Pa.
Hassall, John, Inc., Clay & Oakland Sts., Brooklyn, N. Y.
Hubbard & Co., Pittsburgh, Pa.
Inland Steel Co., Chicago, Ill.
Interstate Iron & Steel Co., Chicago, Ill.
Larkin, J. K., & Co., 34 Reade St., N. Y. C.
Michigan Bolt & Nut Works, Detroit, Mich.
National Bolt & Nut Co., Pittsburgh, Pa.
National Screw & Tack Co., Cleveland, O.
Oliver Iron & Steel Co., Pittsburgh, Pa.
Progressive Mfg. Co., Torrington, Ct.
Rockford Bolt Co., Rockford, Ill.
Steel Car Forge Co., Pittsburgh, Pa.
Townsend Co., New Brighton, Pa.

RODS
Brass and Bronze
Bridgeport Brass Company, Bridgeport, Ct.
Bristol Brass Co., Bristol, Conn.
Connecticut Brass & Mfg. Corporation, Waterbury, Ct.
Brass and Copper
Scovill Mfg. Co., Waterbury, Ct.
Connecting
Bay City Forge Co., Erie, Pa.
Leard, W. B., Works, New Brighton, Pa.
Drill
Aborn Steel Co., Inc., New York City.
Apex Steel Corp., 50 Church St., N. Y. C.
Colonial Steel Co., Pittsburgh, Pa.
Halcomb Steel Co., Syracuse, N. Y.
Pigott, Thomas B., Cleveland, O.
Pittsburgh Tool Steel Wire Co., Monaca, Pa.
Rome Metal Products Company, 87 Nassau Street, New York City.
Standard Gauge Steel Co., Beaver Falls, Pa.
Ward's, Edgar T., Sons Co., Boston, Mass.
Wheelock, Lovejoy & Co., 23 Cliff St., N. Y.
Round and Flat
Washburn Wire Co., Phillipsdale, R. I
Welding
Wilson, W. S., Corp., 155 Chambers St., New York City.
Wire
American Steel & Wire Co., Chicago, Ill.
Fitzsimmons Co., Youngstown, O.
Interstate Iron & Steel Co., Chicago, Ill.
Midvale Steel & Ordnance Co., Philadelphia, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.
Wickwire Bros., Inc., Cortland, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

ROLLING MILL MACHINERY
Birdsboro Steel Foundry & Mach. Co., Birdsboro, Pa.
Blake & Johnson Co., Waterbury, Ct.
Garrison, A., Fdry. Co., Pittsburgh, Pa.
Hyde Park Fdry. & Mch. Co., Hyde Park, Pa.
Lewis Foundry & Machine Co., Pittsburgh, Pa.
Long & Allstatter Co., Hamilton, O.
Mackintosh, Hemphill & Co., Pittsburgh, Pa.
Mesta Machine Co., Pittsburgh, Pa.
Morgan Construction Co., Worcester, Mass.
Morgan Engineering Co., Alliance, O.
Pennsylvania Engineering Works, New Castle, Pa.
Philadelphia Roll & Machine Co., Philadelphia, Pa.
Southwark Fdry. & Mch. Co., Philadelphia, Pa.
Standard Engineering Co., Ellwood City, Pa.
Treadwell Engineering Co., Easton, Pa.
United Engineering & Fdy. Co., Pittsburgh, Pa.
Wellman-Seaver-Morgan Co., Cleveland, O.
Woodard Machine Co., Wooster, O.
Youngstown Fdry. & Mch. Co., Youngstown, O.

ROLLS
Bending and Straightening
Cleveland Punch & Shear Works Co., Cleveland, O.
Covington Machine Co., Covington, Va.
Hilles & Jones Co., Wilmington, Del.
McCabe, J. J., Lathe & Machinery Corporation, 149 Broadway, N. Y.
Niagara Machine & Tool Works, Buffalo, N. Y.
Sand and Chilled
Lewis Foundry & Machine Co., Pittsburgh, Pa.
Sand Chilled and Steel
American Steel Foundries, Chicago, Ill.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Blake & Johnson Co., Waterbury, Ct.
Garrison, A., Foundry Co., Pittsburgh, Pa.
Hyde Park Fdry. & Mch. Co., Hyde Park, Pa.
Mesta Machine Co., Pittsburgh, Pa.
Philadelphia Roll & Machine Co., Philadelphia.
Pittsburgh Rolls Corp., Pittsburgh, Pa.
Standard Engineering & Fdry. Co., Pittsburgh.
United Engineering & Fdy. Co., Pittsburgh, Pa.
Wheeling Mold & Fdry. Co., Wheeling, W. Va.
Youngstown Fdry. & Mch. Co., Youngstown, O.

ROOFING
Cement Tile
Federal Cement Tile Company, Chicago, Ill.
Concrete
Austin Co., The, Cleveland, O.
Open-Hearth Furnace
Orth, Frank, Indiana Harbor, Ind.

ROOFING AND SIDING
Asbestos
Aspromet Company, Pittsburgh, Pa.
Corrugated and Plain
American Sheet & Tin Plate Co., Pittsburgh.
Apollo Steel Co., Apollo, Pa.
La Belle Iron Works, Steubenville, O.
Newport Rolling Mill Co., Newport, Ky.
Trumbull Steel Co., Warren, O.
Iron and Steel
Apollo Steel Co., Apollo, Pa.
Newport Rolling Mill Co., Newport, Ky.
Whitaker-Glessner Co., Wheeling, W. Va.
Youngstown Sheet & Tube Co., Youngstown, O.
Rust Resisting
Aspromet Company, Pittsburgh, Pa.
Newport Rolling Mill Co., Newport, Ky.

ROOFING AND SIDING MACHINERY
Streine Tool & Mfg. Co., New Bremen, O.

ROPE AND CORDAGE
Broderick & Bascom Rope Co., St. Louis, Mo.
Leschen, A., & Sons Rope Co., St. Louis, Mo.
Waterbury Company, 63 Park Row, New York, N. Y.

RUBBER GOODS
Jenkins Bros., 80 White St., N. Y.
New York Belting & Packing Co., 91-93 Chambers St., New York.

RUST PREVENTIVES
Oakley Chemical Co., 22 Thames St., New York City.

RUST PROOFING
Parker Rust Proof Co. of America, Detroit, Mich.

SAFETY GLASSES
Standard Optical Co., Geneva, N. Y.
Strong Kennard & Nutt Co., Cleveland, O.
Willson, T. A., & Co., Inc., Reading, Pa.

SAND
Smith, Werner G., Co., Cleveland, O.
U. S. Silica Company, Chicago, Ill.

SAND BLAST EQUIPMENT
Hoevel Manufacturing Corp., 44 Church St., N. Y. C.
Pangborn Corporation, Hagerstown, Md.
Paxson, J. W., Co., Philadelphia, Pa.
Phoenix Machine Co., Inc., 21 Park Row, New York City.
Sand Mixing Machine Co., 52 Vanderbilt Ave., N. Y. C.
Sly, W. W., Mfg. Company, Cleveland, O.
Tilghman-Brooksbank Sand Blast Co., Philadelphia, Pa.

SAND BLAST MACHINES
Brown Specialty Machinery Co., Chicago, Ill.
Hoevel Manufacturing Corp., 44 Church St., N. Y. C.
MacLeod Co., Cincinnati, O.
Pangborn Corporation, Hagerstown, Md.
Paxson, J. W., Co., Philadelphia, Pa.
Phoenix Machine Co., Inc., 21 Park Row, New York City.
Sand Mixing Machine Co., 52 Vanderbilt Ave., N. Y. C.
Tilghman-Brooksbank Sand Blast Co., Philadelphia, Pa.

SAND BLAST SAND
U. S. Silica Company, Chicago, Ill.

SAND BLAST SHOT AND GRIT
Globe Steel Co., Mansfield, O.
Harrison Supply Co., Boston, Mass.
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

SAND MILLS
Frost Mfg. Co., Chicago, Ill.

SAND SIFTING MACHINES
Brown Specialty Machinery Co., Chicago, Ill.
Hanna Eng. Works, 1761 Elston Ave., Chicago, Ill.

SASH
Steel
Lupton's, David, Sons Co., Philadelphia, Pa.

SASH CORD
Morton, Thos., 245 Centre St., N. Y. C.

SASH OPERATING DEVICES
Drouve, G., Co., Bridgeport, Ct.
Lupton's, David, Sons Co., Philadelphia, Pa.

SAW BLADES AND FRAMES
Hack
Atkins, E. C., & Co., Inc., Indianapolis, Ind.
Victor Saw Works, Springfield, Mass.

SAWING MACHINES
Band for Wood and Metal
Diamond Saw & Stamping Wks., Buffalo, N. Y.
Disston, Henry, & Son, Inc., Philadelphia, Pa.
Espen-Lucas Mach. Works, Philadelphia, Pa.
Hunter Saw & Machine Co., Pittsburgh, Pa.
Q M S Co., 1761 Elston Ave., Chicago, Ill.
Racine Tool & Machine Co., Racine, Wis.
Victor Saw Works, Springfield, Mass.
Circular, for Cold Metal
Earle Gear & Machine Co., Philadelphia, Pa.
Rail
Vandyck-Churchill Co., 91-93 Liberty St., New York City.

SAWS
Bands for Metal
Atkins, E. C., & Co., Inc., Indianapolis, Ind.
Disston, Henry, & Son, Inc., Philadelphia, Pa.
Ohlen, James, & Sons Saw Mfg. Co., Columbus, O.
Simonds Mfg. Co., Fitchburg, Mass.
Williamson, H. C., Chicago, Ill.
Circular Metal
Atkins, E. C., & Co., Inc., Indianapolis, Ind.
Hunter Saw & Machine Co., Pittsburgh, Pa.
Ohlen, James, & Sons Saw Mfg. Co., Columbus, O.
Simonds Mfg. Co., Fitchburg, Mass.
Cold
Atkins, E. C., & Co., Inc., Indianapolis, Ind.
Hack Saw Blades
Atkins, E. C., & Co., Inc., Indianapolis, Ind.
Diamond Saw & Stamping Wks., Buffalo, N. Y.
Racine Tool & Machine Co., Racine, Wis.
Simonds Mfg. Co., Fitchburg, Mass.
Starrett, L. S., Co., Athol, Mass.
Thompson, Henry G., & Son Co., New Haven, Ct.
Victor Saw Works, Springfield, Mass.
Hot Metal
Atkins, E. C., & Co., Inc., Indianapolis, Ind.
Disston, Henry, & Son, Inc., Philadelphia, Pa.
Hunter Saw & Machine Co., Pittsburgh, Pa.
Inserted Tooth, Cold
Hunter Saw & Machine Co., Pittsburgh, Pa.
Simonds Mfg. Co., Fitchburg, Mass.
Metal Slitting
Atkins, E. C., & Co., Inc., Indianapolis, Ind.
Simonds Mfg. Co., Fitchburg, Mass.
Portable Electric
Neil & Smith Electric Tool Co., Cincinnati, O.
Screw Slotting
Atkins, E. C., & Co., Inc., Indianapolis, Ind.
Simonds Mfg. Co., Fitchburg, Mass.
Tool
Disston, Henry, & Son, Inc., Philadelphia, Pa.

SCALES
American Kron Scale Company, 438 East 53rd St., New York City.
Standard Scale & Supply Co., Pittsburgh, Pa.

SCARPHING MACHINES
Skinner & Eddy Corp., Seattle, Wash.

SCLEROSCOPES
Shore Instrument & Mfg. Co., 555-557 W. 22d St., N. Y.

SCRAP
Iron and Steel
Dreifus, Emanuel, & Co., Inc., Philadelphia, Pa.
Fishel & Marks, Cleveland, O.
Granville, Joseph D., Company, St. Louis, Mo.
Hitner's Sons Co., Henry A., Philadelphia, Pa.
Joseph, Jos., & Bros. Co., Cincinnati, O.
Leaf, E. B., Co., Philadelphia, Pa.
Luria Bros. & Co., Woolworth Bldg., New York
Midgley & Prentice, Inc., 69 Dey St., N. Y. City.
Perry, Buxton, Doane Co., Boston, Mass.
Potts, Henry, & Co., Philadelphia, Pa.
Samuel, Frank, Phila., Pa.
Smith, Morton B., Co., 243 Front St., N. Y.

SCREENS
Mining
Chicago Perforating Co., Chicago, Ill.
Harrington & King Perforating Co., Chicago.
Hendrick Mfg. Co., Carbondale, Pa.
Morss & Whyte Co., Cambridge, Mass.
Mundt, Chas., & Sons, Jersey City, N. J.
Perforated Metal
Chicago Perforating Co., Chicago, Ill.
Cross Engineering Co., Carbondale, Pa.
Erdle Perforating Co., Rochester, N. Y.
Harrington & King Perforating Co., Chicago.

Hendrick Mfg. Co., Carbondale, Pa.
Link-Belt Co., Chicago, Ill.
Mundt, Chas., & Sons, Jersey City, N. J.

Woven Wire
Tyler, W. S., Co., Cleveland, O.

SCREW DRIVING MACHINES
Reynolds Machine Co., Massillon, O.

SCREW MACHINE PRODUCTS
American Brass Forging Co., 168 So. Boulevard, New York City.
Ansonia Mfg. Co., Ansonia, Ct.
Atlantic Mfg. Co., Bridgeport, Ct.
Barnes, Wallace Co., Bristol, Ct.
Bertelsmann, Glenn, Co., Indianapolis, Ind.
Blake & Johnson Co., Waterville, Ct.
Bridgeport Metal Goods Mfg. Co., Bridgeport.
Brown Bay Filling Mch. Co., Fitchburg, Mass.
Brown Engineering Co., Reading, Pa.
Brown-McLaren Mfg. Co., Detroit, Mich.
Burgess-Norton Mfg. Co., Geneva, Ill.
Chadbourne-Walker Machine Screw Co., Boston, Mass.
Chicago Screw Co., Chicago, Ill.
Cincinnati Automatic Mach. Co., Cincinnati, O.
Cincinnati Screw Co., Twightwee, O.
Consolidated Machine Co., Detroit, Mich.
Corbin Screw Corp., New Britain, Ct.
Dallett, Thomas H., & Co., Philadelphia, Pa.
Day, William J. Estate, Forestville, Conn.
Delaware Engineering Company, Wilmington, Del.
Eastern Mch. Screw Corp., New Haven, Ct.
Eastern Specialty Co., Philadelphia, Pa.
Enterprise Mfg. Co., Akron, O.
Ericsson Screw Mach. Products Co., Inc., 607 Bergen St., Brooklyn, N. Y.
Federal Nut, Bolt & Machine Co., Cleveland, O.
Grayson Tool & Mfg. Co., Dunbar, W. Va.
Greenhalgh, George H., Newark, N. J.
Greist Mfg. Co., New Haven, Ct.
Hanson Bros. Screw Co., Plainville, Ct.
Hartford Machine Screw Co., Hartford, Ct.
Indianapolis Tool & Mfg. Co., Indianapolis.
International Arms & Fuze Co., Bloomfield, N. J.
K. & Z. Automatic Screw Co., Defiance, O.
Keaveney, W. R., & Son, Inc., Waterbury, Ct.
Lippincott, A. H. & F. H., Philadelphia, Pa.
Mattatuck Mfg. Co., Waterbury, Ct.
Matthews, H. A., Mfg. Co., Seymour, Ct.
Miles, F. S., Co., Philadelphia, Pa.
National Acme Co., Cleveland, O.
Ontario Machine Screw Co., Philadelphia, Pa.
Osborne & Stephenson Mfg. Co., Plainville, Ct.
Ottemiller, Wm. H., Co., York, Pa.
Peck & Young Mfg. Co., Forestville, Ct.
Philadelphia Mch. Screw Works, Phila., Pa.
Progressive Mfg. Co., Torrington, Ct.
Pruyn Ball Bearing Works, Philadelphia, Pa.
Reed Mfg. Co., Erie, Pa.
Rollman Mfg. Co., Mt. Joy, Pa.
St. Louis Screw Co., St. Louis, Mo.
Sears-Cross Co., Bush Terminal No. 20, Brooklyn, N. Y.
Smith, Jos. N., & Co., Detroit, Mich.
Smith, Samuel, Machine Co., Lawrence, Mass.
Spicer Mfg. Corp., South Plainfield, N. J.
Standard Pressed Steel Co., Philadelphia, Pa.
Standard Screw Products Co., Detroit, Mich.
Stevens & Co., 375 Broadway, N. Y.
Thomaston Mfg. Company, Thomaston, Ct.
Tock Screw Machine Products Corp., Long Island City, N. Y.
Toledo Screw Products Co., Toledo, O.
Wellman Products Co., Cleveland, O.
Western Automatic Machine Screw Co., Elyria, O.
Western Screw Products Co., St. Louis, Mo.
Wicaco Screw & Machine Works, Inc., Philadelphia, Pa.
Worcester Machine Screw Co., Worcester, Mass.

SCREW MACHINERY
Automatic
Acme Machine Tool Co., Cincinnati, O.
Cincinnati Automatic Mach. Co., Cincinnati, O.
Fitchburg Automatic Machine Works, Fitchburg, Mass.
Foster Machine Co., Elkhart, Ind.
Hartford Mch. Screw Co., Hartford, Ct.
National Acme Co., Cleveland, O.
Pratt & Whitney Co., Hartford, Ct.

Automatic Wood
Cook, Asa S., Hartford, Ct.

Hand
Garvin Machine Co., 255 Spring St., cor. Varick St., N. Y.
Warner & Swasey Co., Cleveland, O.

Multi-Spindle
Fitchburg Automatic Machine Wks., Fitchburg, Mass.
National Acme Co., Cleveland, O.

Second-hand
Harris Bros. Co., Chicago, Ill.

SCREW STOCK
Cold Rolled.
American Steel & Wire Co., Chicago, Ill.
New England Drawn Steel Co., Mansfield, Mass.

SCREWS
Cap and Set
Bristol Co., Waterbury, Ct.
Clark Bros Bolt Co., Millidale, Ct.
Corbin Screw Corp., New Britain, Ct.
Federal Nut, Bolt & Machine Co., Cleveland, O.
Hartford Mch. Screw Co., Hartford, Ct.
National Lock Company, Rockford, Ill.
Ottemiller, Wm. H., Co., York, Pa.
Reed & Prince Mfg. Co., Worcester, Mass.
Rhode Island Tool Co., Providence, R. I.
Scoville Mfg. Co., Waterbury, Ct.
St. Louis Screw Co., St. Louis, Mo.
Standard Pressed Steel Co., Philadelphia, Pa.
Western Automatic Machine Screw Co., Elyria, O.
Western Screw Products Co., St. Louis, Mo.
Worcester Mch. Screw Co., Worcester, Mass.

Coach and Lag
National Lock Company, Rockford, Ill.
National Screw & Tack Co., Cleveland, O.

Machine
American Screw Co., Providence, R. I.
Atlantic Mfg. Co., Bridgeport, Ct.
Blake & Johnson Co., Waterville, Ct.
Chicago Screw Co., Chicago, Ill.
Cincinnati Screw Co., Twightwee, O.
Corbin Screw Corp., New Britain, Ct.
Eastern Mch. Screw Corp., New Haven, Ct.
Keystone Screw Co., Philadelphia, Pa.
Miles, F. S., Co., Philadelphia, Pa.
National Acme Co., Cleveland, O.
National Lock Company, Rockford, Ill.
National Screw & Tack Co., Cleveland, O.
Philadelphia Machine Screw Wks., Phila., Pa.
Progressive Mfg. Co., Torrington, Ct.
Reed & Prince Mfg. Co., Worcester, Mass.
Standard Pressed Steel Co., Philadelphia, Pa.
Worcester Mch. Screw Co., Worcester, Mass.

Safety Set
Allen Mfg. Co., Inc., Hartford, Ct.
Bristol Co., Waterbury, Ct.
Progressive Mfg. Co., Torrington, Ct.
Standard Pressed Steel Co., Philadelphia, Pa.

Thumb
National Lock Company, Rockford, Ill.

Wood
American Screw Co., Providence, R. I.
Continental Wood Screw Co., New Bedford, Mass.
Corbin Screw Corp., New Britain, Ct.
National Lock Company, Rockford, Ill.
National Screw & Tack Co., Cleveland, O.
Reed & Prince Mfg. Co., Worcester, Mass.

SECOND-HAND MACHINERY
Ashenden, H. H., Waterbury, Ct.
Badger-Packard Machry. Co., Milwaukee, Wis.
Baird, W. J., Machry Co., Detroit, Mich.
Bangerter's, F., Mch. Wks., 425-435 E. 102nd St., New York, N. Y.
Bath, Cyril J., & Co., Cleveland, O.
Beal, Joseph, & Co., Boston, Mass.
Bennett, G. L., Machry. Co., 30 Church St., N. Y. C.
Bertolette Machine Tool Co., Jersey City, N. J.
Biggs-Watterson Co., Cleveland, O. Pa.
Birtwell, W. L., Philadelphia, Pa.
Boston Iron & Metal Co., Baltimore, Md.
Braudy, M., & Sons, Grand Rapids, Mich.
Brearley, H. P., 90 West St., N. Y. C.
Briggs, Marvin, Inc., 167 6th St., Brooklyn.
Broadway Machinery Co., Cincinnati, O.
Brownell Machinery Co., Providence, R. I.
Calleson, C. A., 50 Church St., New York City.
Carpenter & Woodward, Inc., Woolworth Bldg., N. Y. C.
Central Machinery & Supply Co., Cleveland, O.
Clarke, George W., Company, 149 Broadway, N. Y.
Cleveland Belting & Mchy. Co., Cleveland, O.
Coleman, M. P., Boston, Mass.
Cullen, C. W., Machry Co., Cleveland, O.
Curtiss-Willis Co., Inc., 30 Church St., N. Y. City.
Davis, Wm. F., Machine Tool Co., Inc., 85 Liberty St., N. Y. City.
Day Machinery Company, Buffalo, N. Y.
Eastern Mchy. & Equip. Co., Philadelphia, Pa.
Easton Machry. Co., Drake Bldg., Easton, Pa.
Essley, E. L., Mchy. Co., Chicago, Ill.
Everson, T. Bissell, Pittsburgh, Pa.
Factory & Mill Supply Co., Boston, Mass.
Federal Machry. Sales Co., Chicago, Ill.
Foss, Geo. F., Mach. & Supply Co., Montreal, Canada.
Garvin Machine Co., 255 Spring, cor. Varick St., N. Y.
Graves Machry. Exchange, 50 Church St., N. Y. C.
Harris Bros. Co., Chicago, Ill.
Hill, Clarke & Co., Inc., Boston, Mass.
Hill, Clarke & Co. of Chicago, Chicago, Ill.
Hitner's Sons, Henry A., Co., Philadelphia, Pa.
Hollander Mchry. Co., 3 Howard St., N. Y. C.
Howland, F. L., 90 West St., N. Y.
Ideal Switch & Machry. Co., Inc., Plainville, Ct.
Interstate Machinery Co., Troy, N. Y.
Johnson, Wm. C., & Sons, Machry. Co., St. Louis, Mo.
Klein, Nathan, & Co., Inc., 208 Centre St., New York City.
Laird Machinery Company, Buffalo, N. Y.
Lodge & Shipley Mch. Tool Co., Cincinnati, O.
Low, Geo. J., Trustee, 101 Park Ave., New York.
Lucas, J. L., & Son, Bridgeport, Ct.
Lynd Farquhar Company, Boston, Mass.
McCabe, J. J., Lathe & Machinery Corporation, 149 Broadway, N. Y.
McCoy-Brandt Machinery Co., Pittsburgh, Pa.
McMullen Machinery Co., Grand Rapids, Mich.
MacGovern & Co., Inc., 114 Liberty St., N. Y.
Macnab, John, Machinery Co., 90 West St., N. Y.
Marshall & Huschart Mchry. Co., Chicago, Ill.
Modern Machinery Exchange, 52 Walker Street, New York City.
Morris Machinery Co., Newark, N. J.
Morton Machinery Co., Philadelphia, Pa.
Motch & Merryweather Machinery Co., Cleveland, O.
National Products Co., East Liverpool, O.
New Jersey Machinery Exchange, Newark, N. J.
New York Machy. Exchange, 50 Church St., N. Y. C.
Nilson, A. H., Mach. Co., Bridgeport, Ct.
Nuttall, John, Philadelphia, Pa.
O'Brien Machry. Co., Philadelphia, Pa.
Osborne, D. M., Machinery Co., Cleveland, O.
Payne, N. B., 25 Church St., New York City.
Pettler, P., & Son, Beaver Falls, Pa.
Pinner, R. A., 122 Water St., New York, N. Y.
Power Machinery Exchange, Inc., 1 Montgomery St., Jersey City, N. J.
Pratt & Whitney Co., Hartford, Ct.
Prentiss, Henry, & Co., Inc., 149 Broadway, N. Y.
Prichard, C. W., Co., Inc., 50 Church St., N. Y. C.
Purinton & Smith Co., Hartford, Ct.
Quincy Sales Co., Inc., Boston, Mass.
Riverside Machry. Depot, Detroit, Mich.
Russell Machine Co., Pittsburgh, Pa.
Sachsenmaier, Geo., & Co., Philadelphia, Pa.
Saxer-Creider Machry. Co., Erie, Pa.
Schoonmaker, A. G., & Sons, 25 Church St., N. Y. C.
Scully-Jones & Co., Chicago, Ill.
Seyfert's, L. F., Sons, Inc., Philadelphia, Pa.
Sherwood, E. C., 50 Church St., N. Y. C.
Simmons Machine Co., Inc., Albany, N. Y.
Smith, H. A., Machinery Co., Syracuse, N. Y.
Sterling Iron & Steel Company, Philadelphia, Pa.
Stickley, E. B., Machry. Co., Detroit, Mich.
Stocker-Rumely-Wachs Co., Chicago, Ill.
Stone, J. R., Tool & Supply Co., Detroit, Mich.
Strong, Homer, Rochester, N. Y.
Toomey, Frank, Philadelphia, Pa.
Ullman, Jacob, Buffalo, N. Y.
Vonnegut Machry. Co., Indianapolis, Ind.
Wayne Machry. Co., Ft. Wayne, Ind.
Wetherill, Robert, & Co., Inc., Chester, Pa.
White, A. D., Machry. Co., Chicago, Ill.
Wickes Machinery Co., Jersey City, N. J.
Williams, A. R., Machinery Co. of St. John, N. B., Limited, St. John, N. B.
Williamson, H. C., Chicago, Ill.
Winterer, Herman L., Philadelphia, Pa.

SEPARATORS
Inclined Vibrating
Tyler, W. S., Co., Cleveland, O.

Steam and Oil
Harrison Safety Boiler Works, Phila., Pa.

SHAFTING
Cam, Worm, Turbine and Crusher
National Forge & Tool Co., Irvine, Pa.

Cold Drawn
Columbia Steel & Shafting Co., Pittsburgh, Pa.
Lutshaw Steel & Metal Products Corp., 220 Broadway, N. Y. City.
Moltrup Steel Products Co., Beaver Falls, Pa.
National Drawn Steel Co., East Liverpool, O.
Pardee, C., Works, Perth Amboy, N. J.
Pennsylvania Shafting Co., 261 Broadway, N.Y.
Republic Iron & Steel Co., Youngstown, O.
Union Drawn Steel Co., Beaver Falls, Pa.

Cold Rolled
New England Drawn Steel Co., Mansfield, Mass.

Flexible
Stow Mfg. Co., Binghamton, N. Y.

Steel
Blum, Julius, & Co., 510 W. 24th St., New York City.
Bond Fdry. & Mach. Co., Manheim, Pa.
Camden Forge Co., Camden, N. J.
Cresson-Morris Co., Philadelphia, Pa.
Cumberland Steel Co., Cumberland, Md.
Steel Sales Corp., Chicago, Ill.
Ward's, Edgar T., Sons Co., Boston, Mass.
Wheelock, Lovejoy & Co., 23 Cliff St., N. Y.
Wood's, T. B., Sons Co., Chambersburg, Pa.

Turned and Polished
Columbia Steel & Shafting Co., Pittsburgh, Pa.
Cumberland Steel Co., Cumberland, Md.
Fitzsimons Co., Youngstown, O.
Jones & Laughlin Steel Co., Pittsburgh, Pa.

SHAPERS
Tool Room
Cochrane-Bly Co., Rochester, N. Y.

SHAPES
Agricultural
Laclede Steel Co., St. Louis, Mo.

Cold Drawn
Columbia Steel & Shafting Co., Pittsburgh, Pa.
National Drawn Steel Co., East Liverpool, O.

Cold Rolled
New England Drawn Steel Co., Mansfield, Mass.

Pressed Steel
Bossert Corp., Utica, N. Y.
International Metal Mfg. Co., Wayne Junction, Philadelphia, Pa.
Pressed Steel Tank Co., Milwaukee, Wis.

SHAPING MACHINES
American Tool Works Co., Cincinnati, O.
Cincinnati Shaper Co., Cincinnati, O.
Cleveland Punch & Shear Works Co., Cleveland, O.
Gould & Eberhardt, Newark, N. J.
McCabe, J. J., Lathe & Machinery Corporation, 149 Broadway, N. Y.
Ohio Machine Tool Co., Kenton, O.
Steptoe, John, Company, Cincinnati, O.
Stockbridge Machine Co., Worcester, Mass.

SHEAR BLADES
Cleveland Knife & Forge Co., Cleveland, O.
Heppenstall Forge & Knife Co., Pittsburgh, Pa.
Pittsburgh Knife & Forge Co., Pittsburgh, Pa.
Tioga Steel & Iron Co., Philadelphia, Pa.

SHEARING MACHINES
Cedar Rapids Fdry. & Mch. Co., Cedar Rapids, Ia.
Cleveland Punch & Shear Works Co., Cleveland, O.
Morgan Engineering Co., Alliance, O.

Alligator
Canton Fdry. & Mach. Co., Canton, O.
Lewis Foundry & Machine Co., Pittsburgh, Pa.
Long & Allstatter Co., Hamilton, O.
Stoll, D. H., Co., Buffalo, N. Y.

Angle, Hand and Power
Federal Bearing Co., Inc., Poughkeepsie, N. Y.

Bench
Chandler & Farquhar Co., Boston, Mass.

Metal
Camden Iron Works, Camden, N. J.
Canton Fdry. & Mach. Co., Canton, O.
Cleveland Punch & Shear Works Co., Cleveland, O.
Covington Machine Co., Covington, Va.
Garrison, A., Foundry Co., Pittsburgh, Pa.
Hilles & Jones Co., Wilmington, Del.
Long & Allstatter Co., Hamilton, O.
Loy & Nawrath Co., Newark, N. J.
Niagara Machine & Tool Works, Buffalo, N. Y.
Quickwork Company, St. Marys, O.
Toledo Machine & Tool Co., Toledo, O.
United Engineering & Foundry Co., Pittsburgh, Pa.

Metal Slitting
Quickwork Company, St. Marys, O.

Plate
Long & Allstatter Co., Hamilton, O.
Morgan Engineering Co., Alliance, O.
Quickwork Company, St. Marys, O.

Plate Slitting
Morgan Engineering Co., Alliance, O.
Quickwork Company, St. Marys, O.

SHEET METAL MACHINERY
Adriance Machine Works, Inc., 253 Van Brunt St., Brooklyn, N. Y.
Baird, W. J., Machry. Co., Detroit, Mich.
Bliss, E. W., Co., 11 Adams St., Brooklyn, N. Y.
Canton Fdry. & Mach. Co., Canton, O.
Dreis & Krump Mfg. Co., Chicago, Ill.
Excelsior Tool & Machine Co., East St. Louis, Ill.
Ferracute Machine Co., Bridgeton, N. J.
Henderson Machine Co., Philadelphia, Pa.
Leffler, Chas., & Co., 61 Clymer St., Brooklyn, N. Y.
Loy & Nawrath Co., Newark, N. J.
Niagara Machine & Tool Works, Buffalo, N. Y.
Quickwork Company, St. Marys, O.
Streine Tool & Mfg. Co., New Bremen, O.
Toledo Mach. & Tool Co., Toledo, O.
Verdin, Kappes & Verdin Co., Cincinnati, O.
Yoder Company, Cleveland, O.

SHEET METAL SPECIALTIES
American Brass Forging Co., 168 So. Boulevard, New York City.
Baker-Manchester Mfg. Co., Providence, R. I.
Bridgeport Brass Company, Bridgeport, Ct.
Bridgeport Metal Goods Mfg. Co., Bridgeport, Ct.
Coe-Stapley Mfg. Corp., 135 Broadway, New York City.
Cornwall Mfg. Co., Cleveland, O.
Enterprise Mfg. Co., Akron, O.
Fort Dearborn Mfg. Co., Sterling, Ill.
Gem Stamped Steel Co., Boston, Mass.
Geuder, Paeschke, & Frey Co., Contract Mfg. Division, Milwaukee, Wis.
Gler Pressed Steel Co., Lansing, Mich.
Hamilton & DeLoss, Inc., Bridgeport, Ct.
International Metal Mfg. Co., Wayne Junction, Philadelphia, Pa.
Janney, Steinmetz & Co., Philadelphia, Pa.
Johns Machine & Stamping Works Co., 1715 Leonard St., Cleveland, O.
Kansas City Radiator Co., Kansas City, Mo.
Klopping, A. C., Toledo, O.
Monarch Stamping Co., Inc., Chappaqua, N. Y.
Moore & Co., Chicago, Ill.
Pollak, Joseph, Tool & Stamping Co., Boston, Mass.
Rollman Manufacturing Co., Mount Joy, Pa.
Sheet Metal Specialty Co., Inc., Goshen, Ind.
Smith, J. O., Mfg. Co., Middletown, Ct.
Standard Pressed Steel Co., Philadelphia, Pa.
Vogel, Wm., & Bro., Inc., Brooklyn, N. Y.
Waterbury Brass Goods Corp., Waterbury, Ct.
Worcester Stamped Metal Co., Worcester, Mass.
York Heating & Ventilating Co., York, Pa.

SHEETS
Aluminum
Erdle Perforating Co., Rochester, N. Y.
United Smelting & Aluminum Co., New Haven, Ct.

Automobile
Steel Sales Corp., Chicago, Ill.
Wheelock, Lovejoy & Co., 23 Cliff St., N. Y.

Black
American Sheet & Tin Plate Co., Pittsburgh, Pa.
Brier Hill Steel Co., Youngstown, O.
Canton Sheet Steel Co., Canton, O.
Carnahan Tin Plate & Sheet Co., Canton, O.
Inland Steel Co., Chicago, Ill.
La Belle Iron Works, Steubenville, O.
McCullough Iron Co., Wilmington, Del.
Parkersburg Iron & Steel Co., Parkersburg, W. Va.
Trumbull Steel Co., Warren, O.
Whitaker-Glessner Co., Wheeling, W. Va.
Youngstown Sheet & Tube Co., Youngstown, O.

Blue Annealed
Brier Hill Steel Co., Youngstown, O.
Inland Steel Co., Chicago, Ill.
La Belle Iron Works, Steubenville, O.
Seneca Iron & Steel Co., Buffalo, N. Y.
Wood, Alan, Iron & Steel Co., Phila., Pa.

Brass and Copper
Bridgeport Brass Company, Bridgeport, Ct.
Bristol Brass Co., Bristol, Ct.
Connecticut Brass & Mfg. Corporation, Waterbury, Ct.
Scovill Mfg. Company, Waterbury, Ct.
Somers Co., Inc., Waterbury, Ct.
Stamford Rolling Mills Co., 25 Broad St., N. Y. C.
Stimpson, Edwin B., Company, 70 Franklin Ave., Brooklyn, N. Y.
U. S. Motor Truck Co., Cincinnati, O.

Cupro-nickel
Stamford Rolling Mills Co., Springdale, Ct.

Electrical
American Sheet & Tin Plate Co., Pittsburgh, Pa.
Newport Rolling Mill Co., Newport, Ky.
Parkersburg Iron & Steel Co., Parkersburg, W. Va.
Ward's, Edgar T., Sons Co., Boston, Mass.
Wheelock, Lovejoy & Co., 23 Cliff St., N. Y.

For Drawing and Stamping
Allegheny Steel Co., Brackenridge, Pa.
Pigott, Thomas E., Cleveland, O.
Walker, William J., Steel Company, Cleveland.
Wheelock, Lovejoy & Co., 23 Cliff St., N. Y.

Galvanized, Flat and Corrugated
American Sheet & Tin Plate Co., Pittsburgh.
Apollo Steel Co., Apollo, Pa.
Armstrong & Co., Chicago, Ill.
Brier Hill Steel Co., Youngstown, O.
Canton Sheet Steel Co., Canton, O.
Inland Steel Co., Chicago, Ill.
McCullough Iron Co., Wilmington, Del.
Parkersburg Iron & Steel Co., Parkersburg, W. Va.
Scully Steel & Iron Co., Chicago, Ill.
Seneca Iron & Steel Co., Buffalo, N. Y.
Stevens, Chas. G., Co., Chicago, Ill.
Trumbull Steel Co., Warren, O.

Nickel
Seymour Mfg. Co., Seymour, Ct.

Phosphor Bronze
Phosphor-Bronze Co., Philadelphia, Pa.

Rust-Resisting Roofing
Newport Rolling Mill Co., Newport, Ky.

Spring Steel
Wheelock, Lovejoy & Co., 23 Cliff St., N. Y.

Zinc
Illinois Zinc Co., Peru, Ill.
United Smelting & Aluminum Co., New Haven.

SHELL MANUFACTURING EQUIPMENT
American Equipment Co., Bucyrus, O.

SHELVING
Steel
Bernstein Mfg. Co., Philadelphia, Pa.
Edwards Mfg. Company, Cincinnati, O.
Lupton's, David, Sons Co., Philadelphia, Pa.

SHERARDIZING
Custom
Globe Mach. & Stamping Co., Cleveland, O.

SHERARDIZING PLANTS
United States Sherardizing Co., New Castle, Pa.

SHIP BUILDERS' MATERIAL
Frank, Henry, Jr., 372 Hudson Street, New York City.
Liberty Steel Products Co., Inc., Woolworth Bldg., New York City.

SHOP BOXES
Steel
Clark, W. J., Co., Salem, O.
Gem Stamped Steel Co., Boston, Mass.
Sterling Wheelbarrow Co., Milwaukee, Wis.

SHOP FIXTURES
Cleveland Wire Spring Co., Cleveland, O.

SHOT FOR SAND BLAST
(See Sand Blast Shot)

Steam
American Locomotive Co., 30 Church St., N. Y. City.

SHOVELS
Spades and Scoops
Hubbard & Co., Pittsburgh, Pa.

SKIM GATES
Sterling Wheelbarrow Co., Milwaukee, Wis.

SKYLIGHTS
Aspromet Company, Pittsburgh, Pa.
Drouve, G., Co., Bridgeport, Ct.
Lupton's, David, Sons Co., Philadelphia, Pa.

SLINGS
Chain
Columbus McKinnon Chain Company, Columbus, O.

Wire Rope
Roebling's, John A., Sons Co., Trenton, N. J.

SLOTTING MACHINES
Garvin Mach. Co., 255 Spring, cor. Varick St., N. Y.
Newton Machine Tool Works, Philadelphia, Pa.

SOCKETS AND SLEEVES
Standard Tool Co., Cleveland, O.
Toledo Screw Products Co., Toledo, O.

SOCKETS
Wire Rope
Chicago Steel Foundry Co., Chicago, Ill.

SOLDER
Aluminum
Janney, Steinmetz & Co., Philadelphia, Pa.
United Smelting & Aluminum Co., New Haven, Ct.

Plumber's, Tinner's, Etc.
Syracuse Smelting Works, Brooklyn, N. Y.

SPECIAL MACHINERY
American Mach. & Fdry. Co., 5520 2d Ave., Brooklyn, N. Y.
Budd & Ranney Mfg. Co., Columbus, O.
Centre Foundry & Machine Co., Wheeling, W. Va.
Chalmers Mfg. Co., Lima, O.
Colburn Gear & Mfg. Co., Boston, Mass.
Crenshaw Engineering & Construction Co., Inc., 38 Park Row, N. Y. City.
Cummings Machine Works, Boston, Mass.
Delaware Engineering Company, Wilmington, Del.
Eastern Tool & Mfg. Co., Bloomfield, N. J.
Elmes, Chas. F., Engineering Works, Chicago.
Fawcus Mach. Co., Pittsburgh, Pa.
Fort Dearborn Mfg. Co., Sterling, Ill.
Grayson Tool & Mfg. Co., Dunbar, W. Va.
Hoosier Motor Co., Goshen, Ind.
Houston, Stanwood & Gamble Co., Cincinnati, O.
Inman, H. A., Co., Inc., Newark, New York State.
Jersey City Mach. Co., Jersey City, N. J.
Kelton Machine Co., 76 South 8th Street, Brooklyn, N. Y.
Lammert & Mann Co., Chicago, Ill.
Leffler, Charles, & Co., 61 Clymer St., Brooklyn, N. Y.
Manhattan Mach. & Tool Works, Grand Rapids, Mich.
Marvin & Casler Co., Canastota, N. Y.
Morgan Engineering Co., Alliance, O.
Munson Mill Machry. Co., Inc., 405 Broadway, Utica, N. Y.
Nazel Eng. & Mach. Works, Phila., Pa.
Nicholson, W. H., & Co., Wilkes-Barre, Pa.
Palmer, J. Frederick, Mfg. Co., Milwaukee, Wis.
Perry, F. W., Machine Co., Youngstown, O.
Riverside Machine Co., Chester, Pa.
Ruggles Machine Co., Poultney, Vt.
Rupp Mfg. Co., Inc., Hagerstown, Md.
Schoenert, Carl, & Sons, Newark, N. J.
Scott-Fetzer Machine Co., Cleveland, O.
Shepherd Eng. Co., Williamsport, Pa.
Standard Mach. Co., Dayton, O.
Steele & Condict, Inc., Jersey City, N. J.
Sundstrom Manufacturing Company, Chicago, Ill.
Taft-Peirce Mfg. Company, Woonsocket, R. I.
Torrington Mfg. Co., Torrington, Ct.
Verdin, Kappes & Verdin Co., Cincinnati, O.
York Electric & Mach. Co., York, Pa.

SPEED CHANGERS
Moore & White Co., Philadelphia, Pa.

SPEED REDUCERS
Foote Bros. Gear & Mach. Co., Chicago, Ill.

SPELTER
American Zinc & Lead Smelting Co., 120 Broadway, N. Y.
Illinois Zinc Co., Peru, Ill.
Syracuse Smelting Works, Brooklyn, N. Y.
United Smelting & Aluminum Co., New Haven, Ct.

SPIKES
American Steel & Wire Co., Chicago, Ill.
Illinois Steel Co., Chicago, Ill.
Inland Steel Co., Chicago, Ill.
Interstate Iron & Steel Co., Chicago, Ill.
Larkin, J. K., & Co., 34 Reade St., N. Y. C.

SPRING MAKING MACHINERY
Sleeper & Hartley, Inc., Worcester, Mass.

SPRINGS
Leaf
Blum, Julius, Co., 510 W. 24th St., N. Y.
Standard Steel Works Co., Philadelphia, Pa.

Wire
American Steel & Wire Co., Chicago, Ill.
Barnes, Wallace, Co., Bristol, Ct.
Cary Spring Works, 240 W. 29th St., N. Y.
Chatillon, John, & Sons, 85 Cliff St., New York, N. Y.
Cleveland Wire Spring Co., Cleveland, O.
Cook Spring Co., 106th St. & East River, N. Y.
Cuyahoga Spring Co., Cleveland, O.
Dunbar Bros. Co., Bristol, Ct.
Fischer, Chas., Spring Co., 473-485 Kent Ave., Brooklyn, N. Y.
Fort Pitt Spring & Mfg. Co., Pittsburgh, Pa.
General Spring & Wire Co., Detroit, Mich.
Gibson, Wm. D., Co., Chicago, Ill.
Henry & Allen, Auburn, N. Y.
Hubbard Spring Works, Pontiac, Mich.
Mattatuck Mfg. Co., Waterbury, Conn.
Miller & Van Winkle, 18 Bridge St., Brooklyn, N. Y.
Miller Wire Spring Co., Bridgeport, Ct.
Morgan Spring Co., Worcester, Mass.
New York Wire & Spring Co., 586-588 Washington St., N. Y.
Peck & Young Mfg. Co., Forestville, Ct.
Raymond Mfg. Co., Ltd., Corry, Pa.
Springfield Spring Co., Springfield, O.
Union Spring & Mfg. Co., Pittsburgh, Pa.
Washburn Wire Co., Phillipsdale, R. I.

SPROCKETS
Abell-Howe Co., Chicago, Ill.
Baldwin Chain & Mfg. Co., Worcester, Mass.
Crofoot Gear Works, Inc., Boston, Mass.
Cullman Wheel Co., Chicago, Ill.
Jeffrey Mfg. Company, 925 N. 4th St., Columbus, O.
Link-Belt Co., Chicago, Ill.
Stevens & Co., 375 Broadway, N. Y.
Union Chain & Mfg. Co., Seville, O.

SPRUE CUTTERS
Vulcan Eng. Sales Co., 1761 Elston Ave., Chicago, Ill.

STACKS
Steel
Heine Chimney Co., Chicago, Ill.
Pennsylvania Furnace & Stove Co., Warren, Pa.
Petroleum Iron Works Co., Sharon, Pa.
Pittsburg-Des Moines Steel Co., Pittsburgh, Pa.
Steel Plate Products Co., Pottstown, Pa.

STAMPINGS
Acme Die & Stamping Co., McKees Rocks, Pa.
Allegheny Steel Co., Brackenridge, Pa.
American Brass Forging Co., 168 So. Boulevard, New York City.
American Tube & Stamping Co., Bridgeport, Ct.
Anderson Pressed Metal Company, Worcester, Mass.
Ansonia Novelty Company, Ansonia, Ct.
Autoyre Co., Oakville, Ct.
Baker-Manchester Mfg. Co., Providence, R. I.
Barnes, Wallace, Co., Bristol, Ct.
Bates, W. E., Mfg. Works, Waterbury, Ct.
Bettcher Mfg. Co., Cleveland, O.
Blake & Johnson Co., Waterville, Ct.
Blum, Julius, & Co., 510 W. 24th St., New York City.
Bossert Corp., Utica, N. Y.
Bridgeport Brass Company, Bridgeport, Ct.
Bridgeport Chain Co., Bridgeport, Ct.
Bridgeport Metal Goods Mfg. Co., Bridgeport, Ct.
Budd & Ranney Mfg. Co., Columbus, O.
Coe-Stapley Mfg. Corp., 135 Broadway, New York City.
Cornwall Mfg. Co., Cleveland, O.
Crosby Co., Buffalo, N. Y.
Crowe Name Plate & Engraving Co., Chicago, Ill.
Cummings Machine Co., Minster, O.
Cuyahoga Spring Co., Cleveland, O.
Detroit Stamping Co., Detroit, Mich.

Dewes, A., Company, 199 Lafayette Street, New York City.
Douglas & Lomason Co., Detroit, Mich.
England Manufacturing Co., Detroit, Mich.
Enterprise Mfg. Co., Akron, O.
Erdle Perforating Co., Rochester, N. Y.
Gem Mfg. Co., Pittsburgh, Pa.
Gem Stamped Steel Co., Boston, Mass.
Gem Stopper Co., Inc., Philadelphia, Pa.
General Machine & Mfg. Co., Bridgeport, Ct.
General Machine & Tool Works, Mason City Ia.
General Pressed Steel Co., Philadelphia, Pa.
Geuder, Paeschke & Frey Co., Contract Mfg. Division, Milwaukee, Wis.
Gler Pressed Steel Co., Lansing, Mich.
Globe Mach. & Stamping Co., Cleveland, O.
Gray, Peter, & Sons, Inc., Cambridge, Mass.
Hamilton & DeLoss, Inc., Bridgeport, Ct.
Harry Brothers Mfg. Co., Detroit, Mich.
Hoeft & Co., Inc., Chicago, Ill.
Hubbard & Co., Pittsburgh, Pa.
Hubbard Spring Works, Pontiac, Mich.
Humbolt Machine & Stamping Co., Long Island City, N. Y.
International Metal Mfg. Co., Wayne Junction, Philadelphia, Pa.
Interior Metal Mfg. Company, Jamestown, N. Y.
Janney, Steinmetz & Co., Philadelphia, Pa.
Jenkinson, R. C., & Co., Newark, N. J.
Johns Machine & Stamping Works Co., 1715 Leonard St., Cleveland, O.
Kales Stamping Co., Detroit, Mich.
Kansas City Radiator Co., Kansas City, Mo.
Klopping, A. C., Toledo, O.
Konigslow, E., Stamping & Tool Works, Cleveland, O.
Konigslow, Otto, Mfg. Co., Cleveland, O.
Lansing Stamping & Tool Co., Lansing, Mich.
Lippincott, A. H. & F. H., Philadelphia, Pa.
Lothrop, Frank B., Company, South Acton, Mass.
McCord & Co., Chicago, Ill.
McKinney Mfg. Co., Pittsburgh, Pa.
Massachusetts Machine Shop, Inc., Worcester, Mass.
Mattatuck Mfg. Co., Waterbury, Ct.
Matthews, H. A., Mfg. Co., Seymour, Ct.
Matthews Mfg. Co., Worcester, Mass.
Metal Products Co., Mason City, Iowa.
Metal Specialties Mfg. Co., Chicago, Ill.
Metal Specialty Co., Cincinnati, O.
Michigan Metal Spinning Mfg. Co., Detroit, Mich.
Miller Wire Spring Co., Bridgeport, Ct.
Mohegan Tube Co., Brooklyn, N. Y.
Moore & Co., Chicago, Ill.
Morgan Spring Co., Worcester, Mass.
Murray Company, Atlanta, Ga.
New Britain Mch. Co., New Britain, Ct.
Nutting Mfg. Co., Worcester, Mass.
Osborn-Crew Mfg. Co., Cleveland, O.
Parker Wire Goods Co., Worcester, Mass.
Pennsylvania Stamping Co., York, Pa.
Pollak, Joseph, Tool & Stmp. Co., Boston, Mass.
Quinsigamond Pressed Steel Co., Worcester, Mass.
Reliance Die & Stamping Co., Chicago, Ill.
Robbins Gamewell & Co., Pittsfield, Mass.
Rockford Iron Works, Rockford, Ill.
Rollman Manufacturing Co., Mount Joy, Pa.
Root, C. J., Co., Bristol, Ct.
Scovill Mfg. Co., Waterbury, Ct.
Sears-Cross Co., Bush Terminal No. 20, Brooklyn, N. Y.
Seymour Metal Goods Co., Seymour, Ct.
Smith, Jos. N., & Co., Detroit, Mich.
Spicer Mfg. Corporation, South Plainfield, N. J.
Standard Steel Box Co., Bridgeville, Pa.
Standard Tool & Mfg. Co., Detroit, Mich.
Stoll, D. H., Co., Buffalo, N. Y.
Superior Metal Products Co., Elyria, O.
Sutterley, G. T., & Co., Philadelphia, Pa.
Torrington Co., Torrington, Ct.
Transue & Williams Steel Forging Corp., Alliance, O.
Trant & Hine Mfg. Company, New Britain, Ct.
Turner Machine Co., Danbury, Ct.
Tuttle & Bailey Mfg. Co., 52 Vanderbilt Ave., New York City.
Universal Chain Co., Stroudsburg, Pa.
Vogel, Wm. & Bro., Inc., Brooklyn, N. Y.
Wagner, E. R., Mfg. Co., North Milwaukee.
Waterbury Brass Goods Corp., Waterbury, Ct.
Winchester B. & C. Company, Winsted, Ct.
Winfield Mfg. Company, Warren, O.
Worcester Pressed Steel Co., Worcester, Mass.
Worcester Stamped Metal Co., Worcester, Mass.

STAMPS

Steel Alphabets and Figures

Matthews, J. H., & Co., Pittsburgh, Pa.
Pannier Bros. Stamp Co., Pittsburgh, Pa.
Pittsburgh Steel Stamp Co., Pittsburgh, Pa.
Schwerdtle Stamp Co., Bridgeport, Ct.

STANDS

Portable Work

New Britain Mch. Co., New Britain, Ct.

STAPLE MACHINES

Shuster, F. B., Co., New Haven, Ct.

STAPLES

American Steel & Wire Co., Chicago, Ill.
Interstate Iron & Steel Co., Chicago, Ill.
National Screw & Tack Co., Cleveland, O.

STAYBOLT IRON

Milton Mfg. Co., Milton, Pa.
Pittsburgh Forge & Iron Co., Pittsburgh, Pa.

STEAM TRAPS

American Blower Co., Detroit, Mich.
American Steam Gauge & Valve Mfg. Co., Boston, Mass.

STEEL

Alloy

Atlas Crucible Steel Co., Dunkirk, N. Y.
Carnegie Steel Co., Pittsburgh, Pa.
Central Steel Co., Massillon, O.
Colonial Steel Co., Pittsburgh, Pa.
Hercules Electric Steel Co., 137 Lafayette St., N. Y. City.
Hess Steel Corporation, Baltimore, Md.
Latrobe Electric Steel Co., Latrobe, Pa.
National Pressed Steel Co., Massillon, O.
Seaport Steel Co., 217 Broadway, N. Y.
Standard Alloys Co., Pittsburgh, Pa.
Steel Sales Corp., Chicago, Ill.
Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Ward's, Edgar T., Sons Co., Boston, Mass.

Automobile

Aborn Steel Co., Inc., New York City.
Halcomb Steel Co., Syracuse, N. Y.
Hess Steel Corporation, Baltimore, Md.
Latrobe Electric Steel Co., Latrobe, Pa.

Bright Finished

Union Drawn Steel Co., Beaver Falls, Pa.

Carbon

Colonial Steel Co., Pittsburgh, Pa.
Vanadium-Alloys Steel Co., Pittsburgh, Pa.

Chrome

Colonial Steel Co., Pittsburgh, Pa.
Hess Steel Corporation, Baltimore, Md.

Chrome Nickel

Aborn Steel Co., Inc., New York City.
Central Steel Co., Massillon, O.
Colonial Steel Co., Pittsburgh, Pa.
Hercules Electric Steel Co., 137 Lafayette St., N. Y. City.
Hess Steel Corporation, Baltimore, Md.
Latrobe Electric Steel Co., Latrobe, Pa.

Chrome Vanadium

Hess Steel Corporation, Baltimore, Md.

Cold Drawn

Columbia Steel & Shafting Co., Pittsburgh, Pa.
Dickey Steel Co., Inc., 233 Broadway, N. Y. C.
Fitzsimons Co., Youngstown, O.
Halcomb Steel Co., Syracuse, N. Y.
Moltrup Steel Products Co., Beaver Falls, Pa.
National Drawn Steel Co., East Liverpool, O.
New England Drawn Steel Co., Mansfield, Mass.
Pennsylvania Shafting Co., 261 Broadway, N.Y.
Phillips Sheet & Tin Plate Co., Weirton, W. Va.
Pittsburgh Tool Steel Wire Co., Monaca, Pa.
Standard Gauge Steel Co., Beaver Falls, Pa.
Union Drawn Steel Co., Beaver Falls, Pa.
Wetherell Bros. Co., Boston, Mass.
Wheelock, Lovejoy & Co., 23 Cliff St., N. Y.

Cold Rolled and Strips

American Steel & Wire Co., Chicago, Ill.
American Tube & Stamping Co., Bridgeport, Ct.
Athenia Steel Co., 135 William St., N. Y.
Blum, Julius, & Co., 510 W. 24th St., N. Y.
Columbia Steel Co., Elyria, O.
Greer Steel Company, Dover, O.
Griffin Mfg. Co., Erie, Pa.
Harrisburg Pipe & Pipe Bending Co., Harrisburg, Pa.
Midvale Steel & Ordnance Co., Philadelphia, Pa.
Phillips Sheet & Tin Plate Co., Weirton, W. Va.
Pigott, Thomas E., Cleveland, O.
Rome Metal Products Company, 87 Nassau Street, New York City.
Stanford Steel Products Co., Milford, Ct.
Steel Sales Corp., Chicago, Ill.
Superior Steel Corp., Carnegie, Pa.
Walker, William J. Steel Company, Cleveland.
Ward's, Edgar T., Sons Co., Boston, Mass.
Washburn Wire Co., Phillipsdale, R. I.
West Leechburg Steel Co., Pittsburgh, Pa.
Wetherell Bros. Co., Boston, Mass.
Worcester Pressed Steel Co., Worcester, Mass.

Crucible

Atlas Crucible Steel Co., Dunkirk, N. Y.
Firth-Sterling Steel Co., McKeesport, Pa.
Vanadium-Alloys Steel Co., Pittsburgh, Pa.

Cutlery

Wardlow, S. & C., 278 Pearl St., N. Y.
Wetherell Bros. Co., Boston, Mass.

Die

Atlas Crucible Steel Co., Dunkirk, N. Y.
Firth-Sterling Steel Co., McKeesport, Pa.
Hess Steel Corporation, Baltimore, Md.

Electric

Bethlehem Steel Co., So. Bethlehem, Pa.
Braeburn Steel Co., Braeburn, Pa.
Halcomb Steel Co., Syracuse, N. Y.
Hess Steel Corporation, Baltimore, Md.
Illinois Steel Co., Chicago, Ill.
Latrobe Electric Steel Co., Latrobe, Pa.
Simonds Mfg. Co., Lockport, N. Y.
Sivyer Steel Casting Co., Milwaukee, Wis.

High Carbon

Central Steel Co., Massillon, O.
Colonial Steel Co., Pittsburgh, Pa.
Hess Steel Corporation, Baltimore, Md.
Latrobe Electric Steel Co., Latrobe, Pa.

High Speed

Aborn Steel Co., Inc., New York City.
Allen, Edgar, & Co., Ltd., Chicago, Ill.
Apex Steel Corp., 50 Church St., N. Y. C.
Atlas Crucible Steel Co., Dunkirk, N. Y.
Bethlehem Steel Co., S. Bethlehem, Pa.
Braeburn Steel Co., Braeburn, Pa.
Colonial Steel Co., Pittsburgh, Pa.
Dickey Steel Co., Inc., 233 Broadway, N. Y. C.
Firth-Sterling Steel Co., McKeesport, Pa.
Halcomb Steel Co., Syracuse, N. Y.
Hawkridge Bros. Co., Boston, Mass.
Hercules Electric Steel Co., 137 Lafayette St., N. Y. City.
Illingworth, John, Steel Co., Philadelphia, Pa.
Jessop, Wm., & Sons, Inc., 91 John St., N. Y.
Latrobe Electric Steel Co., Latrobe, Pa.
Onondaga Steel Co., Inc., Syracuse, N. Y.
Seaport Steel Co., 217 Broadway, N. Y.
Standard Alloys Co., Pittsburgh, Pa.
Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.
Ward's, Edgar T., Sons Co., Boston, Mass.
Wheelock, Lovejoy & Co., 23 Cliff St., N. Y. C.

Hot and Cold Rolled Strips

American Tube & Stamping Co., Bridgeport, Ct.
Barnes, Wallace, Co., Bristol, Ct.
Griffin Mfg. Co., Erie, Pa.
Hawkridge Bros. Co., Boston, Mass.
Morris & Bailey Steel Co., Pittsburgh, Pa.
National Pressed Steel Co., Massillon, O.
Phillips Sheet & Tin Plate Co., Weirton, W. Va.
Stanford Steel Products Co., Milford, Ct.
Stanley Works, New Britain, Ct.
Steel Sales Corp., Chicago, Ill.
Stevens, Chas. G., Co., Chicago, Ill.
Superior Steel Corp., Carnegie, Pa.
Trumbull Steel Co., Warren, O.
West Leechburg Steel Co., Pittsburgh, Pa.
Worcester Pressed Steel Co., Worcester, Mass.

Importers

Allen, Edgar, & Co., Ltd., Chicago, Ill.
Grant, Robert, Woolworth Bldg., New York City.
Hawkridge Bros. Co., Boston, Mass.
Jessop, Wm. & Sons, Inc., 91 John St., N. Y.
Potts, Horace T., & Co., Philadelphia, Pa.
Swedish Iron & Steel Corp., 12 Platt St., N. Y.

Manganese

Bethlehem Steel Co., So. Bethlehem, Pa.
Central Steel Co., Massillon, O.

Manufacturers

Aborn Steel Co., Inc., New York City.
Amer. Tube & Stamping Co., Bridgeport, Ct.
Carnegie Steel Co., Pittsburgh, Pa.
Central Steel Co., Massillon, O.
Chester Steel Castings Co., Philadelphia, Pa.
Chicago Steel Fdry. Co., Chicago, Ill.
Colonial Steel Co., Pittsburgh, Pa.
Illingworth, John, Steel Co., Philadelphia, Pa.
Inland Steel Co., Chicago, Ill.
Jessop, Wm., & Sons, Inc., 91 John St., N. Y.
Lackawanna Steel Co., 2 Rector St., N. Y.
Lukens Steel Co., Coatesville, Pa.
National Drawn Steel Co., East Liverpool, O.
Onondaga Steel Co., Inc., Syracuse, N. Y.
Republic Iron & Steel Co., Youngstown, O.
Wardlow, S. & C., 278 Pearl St., N. Y.
Whitaker-Glessner Co., Wheeling, W. Va.
Wood, Alan, Iron & Steel Co., Phila.
Youngstown Sheet & Tube Co., Youngstown

Nickel

Aborn Steel Co., Inc., New York City
Central Steel Co., Massillon, O.
Colonial Steel Co., Pittsburgh, Pa.
Electrical Alloy Co., 135 Broadway, N. Y. C.
Latrobe Electric Steel Co., Latrobe, Pa.

Open Hearth

Andrews Steel Company, Newport, Ky.
National Pressed Steel Co., Massillon, O.

Screw

Blum, Julius, Co., 510 W. 24th St., N. Y.
Columbia Steel & Shafting Co., Pittsburgh, Pa.
Union Drawn Steel Co., Beaver Falls, Pa.
Wheelock, Lovejoy & Co., 23 Cliff St., N. Y.

Special Analysis

Andrews Steel Company, Newport, Ky.
Atlas Crucible Steel Co., Dunkirk, N. Y.
Central Steel Co., Massillon, O.
Colonial Steel Co., Pittsburgh, Pa.
Latrobe Electric Steel Co., Latrobe, Pa.
Simonds Mfg. Co., Lockport, N. Y.
West Leechburg Steel Co., Pittsburgh, Pa.

Spring

Aborn Steel Co., Inc., New York City.
Athenia Steel Co., 135 William St., N. Y.
Central Steel Co., Massillon, O.
Latrobe Electric Steel Co., Latrobe, Pa.
Patriarche & Bell, 215 Pearl St., N. Y.

Stamping and Drawing

American Tube & Stamping Co., Bridgeport, Ct.
Columbia Steel Co., Elyria, O.
Griffin Mfg. Co., Erie, Pa.
National Manufacturers Bureau, Washington, D. C.
Phillips Sheet & Tin Plate Co., Weirton, W. Va.
West Leechburg Steel Co., Pittsburgh, Pa.
Worcester Pressed Steel Co., Worcester, Mass.

Tool

Aborn Steel Co., Inc., New York City.
Allen, Edgar, & Co., Ltd., Chicago, Ill.
American Steel Export Co., Woolworth Bldg., New York City.
Apex Steel Corp., 50 Church St., N. Y. C.
Atlas Crucible Steel Co., Dunkirk, N. Y.
Bethlehem Steel Co., South Bethlehem, Pa.
Braeburn Steel Co., Braeburn, Pa.
Colonial Steel Co., Pittsburgh, Pa.
Dickey Steel Co., Inc., 233 Broadway, N. Y. C.
Firth-Sterling Steel Co., McKeesport, Pa.
Grant, Robert, Woolworth Bldg., New York.
Halcomb Steel Co., Syracuse, N. Y.
Hercules Electric Steel Co., 137 Lafayette St., N. Y. City.
Illingworth, John, Steel Co., Philadelphia, Pa.
Jessop, Wm., & Sons, Inc., 91 John St., N. Y.
Latrobe Electric Steel Co., Latrobe, Pa.
Milne, A., & Co., 745 Washington St., N. Y.
Onondaga Steel Co., Inc., Syracuse, N. Y.
Patriarche & Bell, 215 Pearl St., N. Y.
Plass, L., & Co., 96 Water St., New York City.
Potts, Horace T., & Co., Philadelphia, Pa.
Seaport Steel Co., 217 Broadway, N. Y.
Simonds Mfg. Co., Lockport, N. Y.
Standards Alloys Co., Pittsburgh, Pa.
Swedish Iron & Steel Corp., 12 Platt St., N. Y.
Vulcan Crucible Steel Co., Aliquippa, Pa.
Ward's, Edgar T., Sons Co., Boston, Mass.
Wetherell Bros. Co., Boston, Mass.
Wheelock, Lovejoy & Co., 23 Cliff St., N. Y.

Uranium

Standard Alloys Co., Pittsburgh, Pa.

Vanadium

Aborn Steel Co., Inc., New York City.
Andrews Steel Co., Newport, Ky.
Central Steel Co., Massillon, O.
Colonial Steel Co., Pittsburgh, Pa.
Illingworth, John, Steel Co., Philadelphia, Pa.
Latrobe Electric Steel Co., Latrobe, Pa.
Standard Alloys Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.

STEEL BUILDINGS
Aberthaw Construction Company, Boston, Mass.
American Bridge Co., 30 Church St., N. Y.
Austin Co., The, Cleveland, O.
Belmont Iron Works, Philadelphia, Pa.
Berlin Construction Co., Berlin, Ct.
Blaw-Knox Co., Pittsburgh, Pa.
De Cou, Richard, Company, Philadelphia, Pa.
Erie Steel Construction Co., Erie, Pa.
Ferguson Steel & Iron Co., Buffalo, N. Y.
Kenwood Bridge Co., Chicago, Ill.
Lackawanna Bridge Co., 2 Rector St., N. Y.
McClintic-Marshall Co., Pittsburgh, Pa.
Phoenix Iron Co., Philadelphia, Pa.
Riter-Conley Co., Pittsburgh, Pa.
Scaife, Wm. B., & Sons Co., Pittsburgh, Pa.
Shoemaker, Lewis F., & Co., Pottstown, Pa.
Worden-Allen Co., Milwaukee, Wis.

STEEL PLATE CONSTRUCTION
Blaw-Knox Co., Pittsburgh, Pa.
Gillespie Mfg. Co., Jersey City, N. J.
Hamburg Steel Tank Works, Hamburg, Pa.
Hammond Iron Works, Warren, Pa.
International Metal Mfg. Co., Wayne Junction, Philadelphia, Pa.
Lindsay, W. W., & Co., Inc., Philadelphia, Pa.
Pennsylvania Furnace & Stove Co., Warren, Pa.
Petroleum Iron Works Co., Sharon, Pa.
Pittsburgh Annealing Box Co., N. S., Pittsburgh, Pa.
Pittsburg-Des Moines Steel Co., Pittsburgh, Pa.
Riter-Conley, Co., Pittsburgh, Pa.
Standard Tank Co., 15 Park Row, N. Y. City.
Steel Plate Products Co., Pottstown, Pa.
Tippett & Wood, Phillipsburg, N. J.
Wangler, Joseph F., Boiler & Sheet Iron Works Co., St. Louis, Mo.
Warren City Tank & Boiler Works, Warren, O.

STENCIL CUTTING MACHINES
Bradley Stencil Machine Co., St. Louis, Mo.

STOCKS AND DIES
Greenfield Tap & Die Corp., Greenfield, Mass.
Jarecki Mfg. Co., Erie, Pa.
Jones & Lamson Mach. Co., Springfield, Vt.
Saunders' Sons, D., Yonkers, N. Y.

STOKERS
Babcock & Wilcox Co., 85 Liberty St., N. Y.

STOOLS
Steel
Bernstein Mfg. Co., Philadelphia, Pa.
Clark, W. J., Co., Salem, O.

STOPPERS
Open-Hearth Furnace
McCullough-Dalzell Crucible Co., Pittsburgh, Pa.

STOVE TRIMMINGS
Matthews Mfg. Co., Worcester, Mass.

STOVES
Hot Blast
Smythe, S. R., Co., Pittsburgh, Pa.
Sand Drying
Indiana Foundry Co., Indiana, Pa.

STRAIGHTENING AND CUTTING MACHINES
Core Wire
Worthington Pump & Machinery Corp., 115 Broadway, New York City.

STRAIGHTENING MACHINE
Morgan Engineering Co., Alliance, O.

STRUCTURAL IRON AND STEEL WORK
Aberthaw Construction Company, Boston, Mass.
American Bridge Co., 30 Church St., N. Y.
Austin Co., The, Cleveland, O.
Belmont Iron Works, Philadelphia, Pa.
Berlin Construction Co., Berlin, Ct.
Camden Iron Works, Camden, N. J.
Chesapeake Iron Works, Baltimore, Md.
De Cou, Richard, Company, Philadelphia, Pa.
Erie Steel Construction Co., Erie, Pa.
Ferguson Steel & Iron Co., Buffalo, N. Y.
Lackawanna Bridge Co., 2 Rector St., N. Y.
McClintic-Marshall Co., Pittsburgh, Pa.
Phoenix Iron Co., Philadelphia, Pa.
Pittsburgh Annealing Box Co., N. S. Pittsburgh, Pa.
Pittsburg-Des Moines Steel Co., Pittsburgh, Pa.
Scaife, Wm. B., & Sons Co., Pittsburgh, Pa.
Snead Architectural Iron Works, Louisville, Ky.
Western Drop Forge Co., Marion, Ind.
Worden-Allen Co., Milwaukee, Wis.
Second Hand
Lucsam Structural Co., Inc., 38 Park Row, New York, N. Y.

SULPHATE OF IRON
American Steel & Wire Co., Chicago, Ill.

SUPERHEATERS
Steam
Babcock & Wilcox Co., 85 Liberty St., N. Y.
Power Specialty Co., 111 Broadway, N. Y.

SWAGING MACHINES
Torrington Co., Torrington, Ct.

SWITCHBOARDS
Electric Controller & Mfg. Co., Cleveland, O.
General Electric Company, Schenectady, N. Y.
Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa.

SWITCHES
Electric
Electric Controller & Mfg. Co., Cleveland, O.

SYNDOLAG
Basic Products Co., Pittsburgh, Pa.

TABLES
Spacing
Hilles & Jones Co., Wilmington, Del.

TACKS
American Steel & Wire Co., Chicago, Ill.
Cobb & Drew, Inc., Plymouth, Mass.

TAMPING ATTACHMENTS
Molders
Western Tool & Mfg. Co., Springfield, O.

TANKS
Air, Gas, Oil and Water
Air-Tight Steel Tank Co., Pittsburgh, Pa.
Caldwell, W. E., Co., 1940 Brook St., Louisville, Ky.
Camden Iron Works, Camden, N. J.
Cruse-Kemper Co., Ambler, Pa.
Failor-Martin Corporation, 1689 Woolworth Bldg., New York City.
Farrer & Trefts, Inc., Buffalo, N. Y.
Gilbert & Barker Mfg. Co., Springfield, Mass.
Hammond Iron Works, Warren, Pa.
Hauser Stander Tank Co., Cincinnati, O.
Houston, Stanwood & Gamble Co., Cincinnati, O.
Pennsylvania Furnace & Stove Co., Warren, Pa.
Petroleum Iron Works Co., Sharon, Pa.
Pittsburg-Des Moines Steel Co., Pittsburgh, Pa.
Pressed Steel Tank Co., Milwaukee, Wis.
Scaife, Wm. B., & Sons Co., Pittsburgh, Pa.
Shippers' Car Line, 165 Broadway, N. Y. C.
Standard Tank Co., 15 Park Row, N. Y. City.
Steel Plate Products Co., Pottstown, Pa.
Tippett & Wood, Phillipsburg, N. J.
Tudor Boiler Mfg. Co., Cincinnati, O.
Warren City Tank & Boiler Works, Warren, O.
Wood, John, Mfg. Co., Conshohocken, Pa.
Iron and Steel
Caldwell, W. E., Co., 1940 Brook St., Louisville, Ky.
Shippers' Car Line, 165 Broadway, N. Y. C.
Lead Lined
Hauser Stander Tank Co., Cincinnati, O.
Seamless Steel
Janney, Steinmetz & Co., Philadelphia, Pa.
Pressed Steel Tank Co., Milwaukee, Wis.
Second-Hand
Jacobowitz, Chas. S., Buffalo, N. Y.
Kelsey, W. H., Company, Cleveland, O.
Shippers' Car Line, 165 Broadway, N. Y. C.
Welded
Air-Tight Steel Tank Co., Pittsburgh, Pa.
Janney, Steinmetz & Co., Philadelphia, Pa.
Scaife, Wm. B., & Sons Co., Pittsburgh, Pa.
Wood, John, Mfg. Co., Conshohocken, Pa.
Wood
Caldwell, W. E., Co., 1940 Brook St., Louisville, Ky
Hauser Stander Tank Co., Cincinnati, O.

TAP AND DIE HOLDERS
Murchey Machine & Tool Co., Detroit, Mich.

TAPES
Steel
Starrett, L. S., Co., Athol, Mass.

TAPPING MACHINES
Moline Tool Company, Moline, Ill.
Rickert-Shafer Company, Erie, Pa.

TAPS AND DIES
Besly, Chas. H., & Co., Chicago, Ill.
Brubaker, W. L., & Bros., Millersburg, Pa.
Greenfield Tap & Die Corp., Greenfield, Mass.
Murchey Machine & Tool Co., Detroit, Mich.
Reliance Steel & Tool Co., Inc., 24-26 Murray St., New York City.
Standard Tool Co., Cleveland, O.

TAR DISTILLATION PLANTS
Koppers, H., Co., Pittsburgh, Pa.

TELEGRAPH AND TELEPHONE LINE MATERIAL
Oliver Iron & Steel Co., Pittsburgh, Pa.

TERNE PLATE
American Sheet & Tin Plate Co., Pittsburgh, Pa.
Carnahan Tin Plate & Sheet Co., Canton, O.
Standard Tin Plate Co., Canonsburg, Pa.
Taylor, N. & G., Co., Philadelphia, Pa.

TESTING MACHINES
Hardness
Holz, Herman A., 1 Madison Ave., N. Y. C.
Scientific Materials Co., 717 Forbes St, Philadelphia, Pa.
Shore Instrument & Mfg. Co., 555-557 W. 22d St., N. Y. C.

THERMOMETERS
Calorimeter
Taylor Instrument Companies, Rochester, N. Y.
Recording
Bristol Co., Waterbury, Ct.
Brown Instrument Co., Philadelphia, Pa.
Engelhard, Chas., 30 Church St., N. Y.
Taylor Instrument Companies, Rochester, N. Y.
Resistance
Engelhard, Chas., 30 Church St., N. Y.

THREAD CUTTING
Lindholm Metal Stamping Co., Inc., Camden, N. J.

THREAD MILLING
Moline Tool Company, Moline, Ill.

THREAD ROLLING MACHINES
Blake & Johnson Co., Waterbury, Ct.
Nilson, A. H., Mach. Co., Bridgeport, Ct.

THREADING TOOLS
Greenfield Tap & Die Corp., Greenfield, Mass.
Rivett Lathe & Grinder Co., Brighton, Boston, Mass.

TIE PLATES
Inland Steel Co., Chicago, Ill.
Joliet Wrought Washer Co., Joliet, Ill.

TIES
Bale
American Steel & Wire Co., Chicago, Ill.
Creosoted
Ayer & Lord Tie Co., Chicago, Ill.
Jennison-Wright Co., Toledo, O.

TIME RECORDING MACHINES
Brown Instrument Co., Philadelphia, Pa.
Eco Clock Co., Boston, Mass.
Newman Clock Co., 178 Fulton St., N. Y.

TIN
Syracuse Smelting Works, Brooklyn, N. Y.

TIN PLATE
American Sheet & Tin Plate Co., Pittsburgh, Pa.
American Steel Co., Pittsburgh, Pa.
American Steel Export Co., Woolworth Bldg., New York City.
Carnahan Tin Plate & Sheet Co., Canton, O.
Grant, Robert, Woolworth Bldg., N. Y. C.
Standard Tin Plate Co., Canonsburg, Pa.
Taylor, N. & G., Co., Philadelphia, Pa.
Trumbull Steel Co., Warren, O.

TINNERS' TOOLS AND MACHINES
Niagara Machine & Tool Works, Buffalo, N. Y.

TINNING
Hot Process, Job
Rollman Manufacturing Co., Mount Joy, Pa.

TINWARE MACHINERY
Bliss, E. W., Co., 11 Adams St., Brooklyn, N. Y.

TIRES
Rubber
Goodrich, B. F., Co., Akron, O.

TONGS
Blacksmith
Moore Drop Forging Co., Springfield, Mass.

TOOL HOLDERS
Armstrong Bros. Tool Co., Chicago, Ill.
Western Tool & Mfg. Co., Springfield, O.
Williams, J. H., & Co., 57 Richards St., N. Y. C.

TOOL POSTS
Turret
McCrosky Reamer Co., Meadville, Pa.

TOOLS
Blacksmith and Wheelwright
Champion Blower & Forge Co., Lancaster, Pa.
Warren Tool & Forge Co., Warren, O.
Boring
Lovejoy Tool Co., Inc., Springfield, Vt.
Carpenters'
Starrett, L. S., Co., Athol, Mass.
Lathe
Armstrong Bros. Tool Co., Chicago, Ill.
Lovejoy Tool Co., Inc., Springfield, Vt.
Pratt & Whitney Co., Hartford, Ct.
Machinists'
Baird, W. J., Machry. Co., Detroit, Mich.
Besly, Chas. H., & Co., Chicago, Ill.
Meyers, W. F., Tool & Gauge Co., Bedford, Ind.
Starrett, L. S., Co., Athol, Mass.
Stone, J. R., Tool & Supply Co., Detroit, Mich.
Taft-Peirce Mfg. Company, Woonsocket, R. I.
Wickes Brothers, Saginaw, Mich.
Williams, J. H., & Co., 57 Richards St., Brooklyn, N. Y.
Planing Machine
Armstrong Bros. Tool Co., Chicago, Ill.
Portable
Underwood, H. B., & Co., Philadelphia, Pa.
Saw
Atkins, E. C., & Co., Inc., Indianapolis, Ind.
Screw Machine
Foster Machine Co., Elkhart, Ind.
Steam and Gas Fitters
Saunders' Sons, D., Yonkers, N. Y.
Walworth Mfg. Co., Boston, Mass.
Turning
Lovejoy Tool Co., Inc., Springfield, Vt.

TORCHES
Gas
Naab Mfg. Company, The, Cleveland, O.
Oil
Mahr Mfg. Co., Minneapolis, Minn.

TOWERS
Steel
Caldwell, W. E., Co., 1940 Brook St., Louisville, Ky.
Pittsburg-Des Moines Steel Co., Pittsburgh, Pa.
Transmission
American Bridge Co., 30 Church St., N. Y.
Blaw-Knox Co., Pittsburgh, Pa.
Scaife, Wm. B., & Sons Co., Pittsburgh, Pa.
Water
Caldwell, W. E., Co., 1940 Brook St., Louisville, Ky.

TRACK
Industrial
Chase Fdry. & Mfg. Co., Columbus, O.
Easton Car & Construction Co., Easton, Pa.
Indianapolis Switch & Frog Co., Springfield, O.
Koppel, Orenstein-Arthur Co., Pittsburgh, Pa.
Lakewood Eng. Co., Cleveland, O.
Treadwell, M. H., Co., 140 Cedar St., N. Y. C.
Portable
Atlas Car & Mfg. Co., Cleveland, O.
Easton Car & Construction Co., Easton, Pa.
Koppel, Orenstein-Arthur Co., Pittsburgh, Pa.
Lakewood Eng. Co., Cleveland, O.

TRACTORS
Lakewood Engineering Co., Cleveland, O.

TRAILERS
Factory and Warehouse
Lakewood Engineering Co., Cleveland, O.

TRAMRAILS
Overhead Systems
Box, Alfred, & Co., Philadelphia, Pa.
Brown Hoisting Machry. Co., Cleveland, O.
N. J. Foundry & Machine Co., 140 Cedar St., New York.
Randall Tramrail Co., Philadelphia, Pa.

TRAMWAYS
Wire Rope
American Steel & Wire Co., Chicago, Ill.
Broderick & Bascom Rope Co., St. Louis, Mo.

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Leschen, A., & Sons Rope Co., St. Louis, Mo.
Macomber & Whyte Rope Co., Kenosha, Wis.
Moon, Geo. C., Company, Garwood, N. J.
Roebling's, J. A., Sons Co., Trenton, N. J.

TRANSFORMERS
Lighting and Power
General Electric Company, Schenectady, N. Y.
Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa.

TROLLEYS
Brown Hoisting Machry. Co., Cleveland, O.
Euclid Crane & Hoist Co., Euclid, O.
Ford Chain Block & Mfg. Co., Phila., Pa.
N. J. Foundry & Machine Co., 140 Cedar St., New York.
Randall Tramrail Co., Philadelphia, Pa.
Roeper Crane & Hoist Works, Reading, Pa.
Wright Mfg. Co., Lisbon, O.

TRUCKS
Electric
Koppel, Orenstein-Arthur Co., Pittsburgh, Pa.
Elevating
Barrett-Cravens Co., 734 Federal St., Chicago.
Lewis-Shepard Co., Boston, Mass.
Western Tool & Mfg. Co., Springfield, O.
Industrial
Abell-Howe Co., Chicago, Ill.
Edwards Mfg. Co., Cincinnati, O.
Lakewood Eng. Co., Cleveland, O.
Lewis-Shepard Co., Boston, Mass.
McKinney Mfg. Co., Pittsburgh, Pa.
Sterling Wheelbarrow Co., Milwaukee, Wis.
Western Tool & Mfg. Co., Springfield, O.
Motor
White Co., Cleveland, O.

TUBE EXPANDERS
Henderer's, A. L., Sons, Wilmington, Del.

TUBE MILL MACHINERY
Loy & Nawrath Co., Newark, N. J.
Standard Engineering Co., Ellwood City, Pa.

TUBES
Boiler
Allegheny Steel Co., Brackenridge, Pa.
de Lascurian, E., 51 Chambers St., New York.
Detroit Seamless Steel Tubes Co., Detroit, Mich.
National Tube Co., Pittsburgh, Pa.
Rolfe Iron Company, Chicago, Ill.
Scully Steel & Iron Co., Chicago, Ill.
Seamless Steel
Detroit Seamless Steel Tube Co., Detroit, Mich.
National Tube Co., Pittsburgh, Pa.
Steel Sales Corp., Chicago, Ill.
Steel
National Tube Co., Pittsburgh, Pa.

TUBING
Bent
Standard Parts Co., Cleveland, O.
Standard Tool & Mfg. Co., Detroit, Mich.
Flexible Metallic
Pennsylvania Flexible Metallic Tubing Co., Philadelphia, Pa.
Rubber
Goodrich, B. F., Co., Akron, O.
Seamless Brass and Copper
Bridgeport Brass Company, Bridgeport, Ct.
Bristol Brass Co., Bristol, Ct.
Standard Parts Co., Cleveland, O.
Seamless Cold Drawn
Detroit Seamless Steel Tubes Co., Detroit, Mich.
National Tube Co., Pittsburgh, Pa.
Timken Roller Bearing Co., Canton, O.
Ward's, Edgar T., Sons Co., Boston, Mass.
Seamless Steel
Blum, Julius, & Co., 510 W. 24th St., N. Y.
Detroit Seamless Steel Tubes Co., Detroit, Mich.
National Tube Co., Pittsburgh, Pa.
Rome Metal Products Company, 87 Nassau St., New York City.
Standard Parts Co., Cleveland, O.
Timken Roller Bearing Co., Canton, O.
Square and Rectangular
National Tube Co., Pittsburgh, Pa.
Steel
Mohegan Tube Co., Brooklyn, N. Y.
Ohio Steel Products Co., Mineral Ridge, O.
Pressed Metal Radiator Co., Pittsburgh, Pa.
Timken Roller Bearing Co., Canton, O.
Ward's, Edgar T., Sons Co., Boston, Mass.

TUMBLING BARRELS
Baird Machine Co., Bridgeport, Ct.
Globe Machine & Stamping Co., Cleveland, O.
Paxson, J. W., Co., Philadelphia, Pa.
Sly, W. W., Mfg. Company, Cleveland, O.
Whiting Fdry. Equip. Co., Harvey, Ill.

TUNGSTEN
Metallic
Primos Chemical Co., Primos, Pa.
Vanadium-Alloys Steel Co., Pittsburgh, Pa.

TURBINES
De Laval Steam Turbine Co., Trenton, N. J.
Southwark Fdry. & Mch. Co., Philadelphia, Pa.
Terry Steam Turbine Co., Hartford, Ct.
Hydraulic
Wellman-Seaver-Morgan Co., Cleveland, O.

TURBO-GENERATORS
Steam
General Electric Company, Schenectady, N. Y.
Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa.

TURNBUCKLES
Larkin, J. K., & Co., 34 Reade St., N. Y. City.
Marine Hardware-Equip. Co., So. Portland, Me.
Merrill Bros., Maspeth, N. Y.
Michigan Bolt & Nut Works, Detroit, Mich.
Moon, Geo. C., Company, Garwood, N. J.
Roebling's, John A., Sons Co., Trenton, N. J

TURNING
Steel
Bidle, W. S., Company, Cleveland, O.

TURN TABLES
Easton Car & Construction Co., Easton, Pa.
Koppel, Orenstein-Arthur Co., Pittsburgh, Pa.
Whiting Fdry. Equipment Co., Harvey, Ill.

TUYERES, COOLERS, ETC.
Blast Furnace
Keystone Bronze Co., Pittsburgh, Pa.

TWIST DRILLS
Cleveland Power Transmission Co., Cleveland, O.
Jaeger, M., Cleveland, O.
Reliance Steel & Tool Co., Inc., 30 Church St., New York City.
Standard Tool Co., Cleveland, O.
Union Twist Drill Co., Athol, Mass.
Welborne & Co., 45 Beaver St., N. Y. City.
Whitman & Barnes Mfg. Co., Akron, O.

UNIONS
Dart, E. M., Mfg. Co., Providence, R. I.
Jefferson Union Co., Lexington, Mass.
Larkin, J. K., & Co., 34 Reade St., N. Y. City.
Walworth Mfg. Co., Boston, Mass.
Steel
Walworth Mfg. Co., Boston, Mass.

UPSETTING AND FORGING MACHRY.
Acme Machinery Co., Cleveland, O.
Cook, Asa S., Hartford, Ct.
National Machinery Co., Tiffin, O.

VALVES
Automatic Cut Off for Gas
Oven Equipment & Mfg. Co., New Haven, Ct.
Back Pressure & Automatic Relief
Harrison Safety Boiler Wks., Philadelphia, Pa.
Blow-off, Fegrinding Gate, Emergency
Eynon Evans Mfg. Co., Philadelphia, Pa.
Gas and Air Reversing
Morgan Construction Co., Worcester, Mass.
Smythe, S. R., Co., Pittsburgh, Pa.
Wellman-Seaver-Morgan Co., Cleveland, O.
Gas, Water and Steam
Kennedy Valve Mfg. Co., Elmira, N. Y.
Larkin, J. K., & Co., 34 Reade St., N. Y. C.
Lunkenheimer Co., Cincinnati, O.
Pittsburgh Piping & Equipment Co., Pittsburgh, Pa.
Pittsburgh Valve, Fdry. & Construction Co., Pittsburgh, Pa.
Smith Gas Engineering Co., Dayton, O.
Wood, R. D., & Co., Philadelphia, Pa.
Hydraulic
Hydraulic Press Mfg. Co., Mount Gilead, O.
Metalwood Mfg. Co., Detroit, Mich.
Southwark Fdry. & Mch. Co., Philadelphia, Pa.
Sterling Specialty Company, Newcomerstown, Ohio.
Watson-Stillman Co., 190 Fulton St., N. Y.
Pop, Safety and Relief
American Steam Gauge & Valve Mfg. Co., Boston, Mass.
Rubber
Goodrich, B. F., Co., Akron, O.
Water and Gas
Kennedy Valve Mfg. Co., Elmira, N. Y.

VENTILATORS
American Blower Co., Detroit, Mich.
Burt Mfg. Co., Akron, O.
International Metal Mfg. Co., Wayne Junction, Philadelphia, Pa.

VIBRATORS
Mumford Molding Machine Co., 1761 Elston Ave., Chicago, Ill.
Western Tool & Mfg. Co., Springfield, O.

VISE STANDS
Portable
Western Tool & Mfg. Co., Springfield, O.

VISES
Brown Engineering Co., Reading, Pa.
Eagle Anvil Works, Trenton, N. J.
Reed Mfg. Co., Erie, Pa.
Skinner Chuck Co., New Britain, Ct.
Warren Tool & Forge Co., Warren, O.

WASHER CUTTING MACHINES
Southwark Fdry. & Mch. Co., Philadelphia, Pa.

WASHERS
Air
American Blower Co., Detroit, Mich.
Ball Bearing Race
Auburn Ball Bearing Co., Rochester, N. Y.
Brass and Copper
Cobb & Drew, Plymouth, Mass.
Massachusetts Machine Shop, Inc., Worcester, Mass.
Felt
Booth-Felt Co., Inc., 440 19th St., Brooklyn, N. Y.
Iron and Steel
Bettcher Mfg. Co., Cleveland, O.
Hubbard & Co., Pittsburgh, Pa.
Joliet Wrought Washer Co., Joliet, Ill.
Kales Stamping Co., Detroit, Mich.
Larkin, J. K., & Co., 34 Reade St., N. Y. C.
Milton Mfg. Co., Milton, Pa.
Stanley Works, New Britain, Ct.
Tucker Tool & Mach. Co., 75 Murray St., N.Y.
Wrought Washer Mfg. Co., Milwaukee, Wis.
Lock
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Lock, Plain and Positive
Tucker Tool & Mch. Co., 75 Murray St., N. Y.
Spring Steel
Dunbar Bros. Co., Bristol, Ct.
Tempered
Barnes, Wallace Co., Bristol, Ct.
Wrought
Nicetown Plate Washer Co., Phila., Pa.
Wrought Washer Mfg. Co., Milwaukee, Wis.

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Newman Clock Co., 178 Fulton St., N. Y.

WATER-COOLED DEVICES
Blaw-Knox Co., Pittsburgh, Pa.

WATER SOFTENING AND PURIFYING
Dearborn Chemical Co., Chicago, Ill.
Scaife, Wm. B., & Sons Co., Pittsburgh, Pa.

WEDGES
Foundry
Sterling Wheelbarrow Co., Milwaukee, Wis.

WEIGHTS
Iron
Iron Trading Corporation, 15 Park Row, N. Y. City.

WELDED PRODUCTS
Electric
Standard Screw Products Co., Detroit, Mich.

WELDING
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Federal Machine & Welder Company, Warren, O.
Mohegan Tube Co., Brooklyn, N. Y.
Standard Parts Co., Cleveland, O.
Thomson Electric Welding Co., Lynn, Mass.
Thomson Spot Welder Co., Cincinnati, O.
Westinghouse Electric & Mfg. Co., Pittsburgh, Pa.
Winfield Mfg. Company, Warren, O.
Oxy-Acetylene
Bossert Corp., Utica, N. Y.
Davis-Bournonville Co., Jersey City, N. J.
Gillespie Mfg. Co., Jersey City, N. J.
Mohegan Tube Co., Brooklyn, N. Y.
Oxweld Acetylene Co., Chicago, Ill.

WELDING & CUTTING APPARATUS & SUPPLIES
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Federal Machine & Welder Company, Warren, O.
Imperial Brass Mfg. Co., Chicago, Ill.
International Oxygen Company, 115 B'way, N. Y. C.
Linde Air Products Co., 42nd Street Building, New York.
MacLeod Co., Cincinnati, O.
Messer Mfg. Co., Philadelphia, Pa.
Milburn, Alexander, Co., Baltimore, Md.
Oxweld Acetylene Co., Chicago, Ill.

WELDING MACHINES
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Federal Machine & Welder Company, Warren, O.
Thomson Electric Welding Co., Lynn, Mass.
Thomson Spot Welder Co., Cincinnati, O.

WELDING PROCESS
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WELDING SUPPLIES
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Sterling Wheelbarrow Co., Milwaukee, Wis.

WHEELS
Car, Cast Iron and Steel
Carnegie Steel Co., Pittsburgh, Pa.
Houston Car Wheel & Mach. Co., Houston, Tex.
Car Chilled Iron
Association of Manufacturers of Chilled Car Wheels, Chicago, Ill.
Pressed Steel
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Registering
Stewart, The, Mfg. Co., Chicago, Ill.
Rolled Steel
Standard Steel Works Co., Philadelphia, Pa.
Wire Bicycle Motor Cycle
Standard Parts Co., Cleveland, O.

WHITE METALS
Seymour Mfg. Co., Seymour, Ct.

WHITEWASHING OUTFITS
Deming Co., Salem, O.

WINCHES
Electric
Gilbert-Grant Co., 141 Broadway, New York.

WINDOWS
Steel
Lupton's, David, Sons Co., Philadelphia, Pa.

WIRE
American Steel & Wire Co., Chicago, Ill.
American Steel Export Co., Woolworth Bldg., New York City.
Driscoll Wire Co., The, Derby, Ct.
Grant, Robert, Woolworth Bldg., New York City.
Gulf States Steel Co., Birmingham, Ala.
Larkin, J. K., & Co., 34 Reade St., N. Y. City.
Michigan Wire Cloth Co., Detroit, Mich.
Miller & Van Winkle, 18 Bridge St., Brooklyn, N. Y.
Phosphor-Bronze Smelting Co., Phila., Pa.
Roebling's, John A., Sons Co., Trenton, N. J.
Seneca Wire & Mfg. Co., Fostoria, O.
Spencer Wire Co., Worcester, Mass.
Springfield Spring Co., Springfield, O.
Townsend Co., New Brighton, Pa.
Webb Wire Works, New Brunswick, N. J.
Wickwire Bros., Inc., Cortland, N. Y.
Wright Wire Co., Worcester, Mass.
Aeroplane
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Barb
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Interstate Iron & Steel Co., Chicago, Ill.
Larkin, J. K., & Co., 34 Reade St., N. Y. City.
Broom
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Drawn Steel
Pittsburgh Tool Steel Wire Co., Monaca, Pa.
Fence
American Steel & Wire Co., Chicago, Ill.
Interstate Iron & Steel Co., Chicago, Ill.
Youngstown Sheet & Tube Co., Youngstown, O.

Flat, Round and Square
American Steel & Wire Co., Chicago, Ill.
Dehaven Mfg. Co., 50 Columbia Heights, Brooklyn, N. Y.
Driscoll Wire Co., The, Derby, Ct.
Electrical Alloy Co., 135 Broadway, N. Y. C.
Roebling's, J. A., Sons Co., Trenton, N. J.
Washburn Wire Co., Phillipsdale, R. I.

German Silver
Stamford Rolling Mills Co., Springdale, Ct.

Insulated
Roebling's, John A., Sons Co., Trenton, N. J.

Lathing
N. J. Wire Cloth Co., Trenton, N. J.

Mattress
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Seneca Wire & Mfg. Co., Fostoria, O.

Monel Nickel
Electrical Alloy Co., 135 Broadway, N. Y. C.

Nickel
Electrical Alloy Co., 135 Broadway, N. Y. C.
Seymour Mfg. Co., Seymour, Ct.

Phosphor Bronze
Phosphor-Bronze Smelting Co., Philadelphia, Pa.

Piano and Music
Aborn Steel Co., Inc., New York City.
American Steel & Wire Co., Chicago, Ill.
Ward's, Edgar T., Sons Co., Boston, Mass.
Washburn Wire Co., Phillipsdale, R. I.
Waterbury Company, 63 Park Row, New York, N. Y.
Webb Wire Works, New Brunswick, N. J.

Resistance
Electrical Alloy Co., 135 Broadway, N. Y. C.

Rubber Covered
American Steel & Wire Co., Chicago, Ill.
Goodrich, B. F., Co., Akron, O.
Hazard Mfg. Co., Wilkes-Barre, Pa.

Spoke and Crimping
American Steel & Wire Co., Chicago, Ill.
Roebling's, John A., Sons Co., Trenton, N. J.

Strand
American Steel & Wire Co., Chicago, Ill.
Roebling's, John A., Sons Co., Trenton, N. J.

Telephone and Telegraph
American Steel & Wire Co., Chicago, Ill.
Roebling's, John A., Sons Co., Trenton, N. J.

Trolley
Roebling's, John A., Sons Co., Trenton, N. J.

Weaving
American Steel & Wire Co., Chicago, Ill.

Welding
Apex Steel Corp., 50 Church St., N. Y. C.
Swedish Iron & Steel Corp., 12 Platt St., N. Y. C.
Wilson, W. S., Corp., 155 Chambers St., New York City.

WIRE CLOTH
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Michigan Wire Cloth Co., Detroit, Mich.
Morss & Whyte Co., Cambridge, Mass.
N. J. Wire Cloth Co., Trenton, N. J.
Tyler, W. S., Co., Cleveland, O.
Wickwire Bros., Inc., Cortland, N. Y.
Wright Wire Co., Worcester, Mass.

WIRE COILING MACHINERY
Sleeper & Hartley, Inc., Worcester, Mass.

WIRE CRIMPERS
Automatic Machine Co., Bridgeport, Ct.

WIRE DRAWING MACHINES
New England Machinery Co., New Haven, Ct.

WIRE FORMING MACHINERY
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WIRE GOODS
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Wickwire Bros., Inc., Cortland, N. Y.

WIRE GUARDS
Buffalo Wire Works Co., Buffalo, N. Y.

WIRE MILL EQUIPMENT
Morgan Construction Co., Worcester, Mass.
New England Machinery Co., New Haven, Ct.

WIRE NAIL MACHINERY
National Machinery Co., Tiffin, O.
Sleeper & Hartley, Inc., Worcester, Mass.

WIRE PARTS
Bridgeport Chain Co., Bridgeport, Ct.
Eastern Tool & Mfg. Co., Bloomfield, N. J.
Gem Stopper Co., Inc., Philadelphia, Pa.
Jenkinson, R. C., & Co., Newark, N. J.

WIRE ROPE
American Steel & Wire Co., Chicago, Ill.
Armstrong & Co., Chicago, Ill.
Broderick & Bascomb Rope Co., St. Louis, Mo.
Curtiss-Willis Co., Inc., 30 Church St., N. Y. City.
Failor-Martin Corporation, 1689 Woolworth Bldg., New York City.
Hazard Mfg. Co., Wilkes-Barre, Pa.
Larkin, J. K., & Co., 34 Reade St., N. Y.
Leschen, A., & Sons Rope Co., St. Louis, Mo.
Macomber & Whyte Rope Co., Kenosha, Wis.
Moon, Geo. C., Company, Garwood, N. J.
Roebling's, John A., Sons, Co., Trenton, N. J.
Waterbury Company, 63 Park Row, New York, N. Y.
Wright Wire Co., Worcester, Mass.

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Parker Wire Goods Co., Worcester, Mass.
Spencer Wire Co., Worcester, Mass.

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Ornamental
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WOOD BLOCK FLOORING
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Jennison-Wright Co., Toledo, O.
Pittsburgh Wood Preserving Co., Pittsburgh.

WOOD WORKING MACHINERY
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Hermance Machine Co., Williamsport, Pa.
Seneca Falls Mfg. Co., Seneca Falls, N. Y.
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Second-Hand
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Herbrand Co., Fremont, O.
Indianapolis Drop Forging Co., Indianapolis, Ind.
Page-Storms Drop Forge Co., Chicopee, Mass.
Trimont Mfg. Co., Roxbury, Mass.
Walworth Mfg. Co., Boston, Mass.
Whitman & Barnes Mfg. Co., Akron, O.
Williams, J. H., & Co., 57 Richards St., Brooklyn, N. Y.
Alligator
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Pipe
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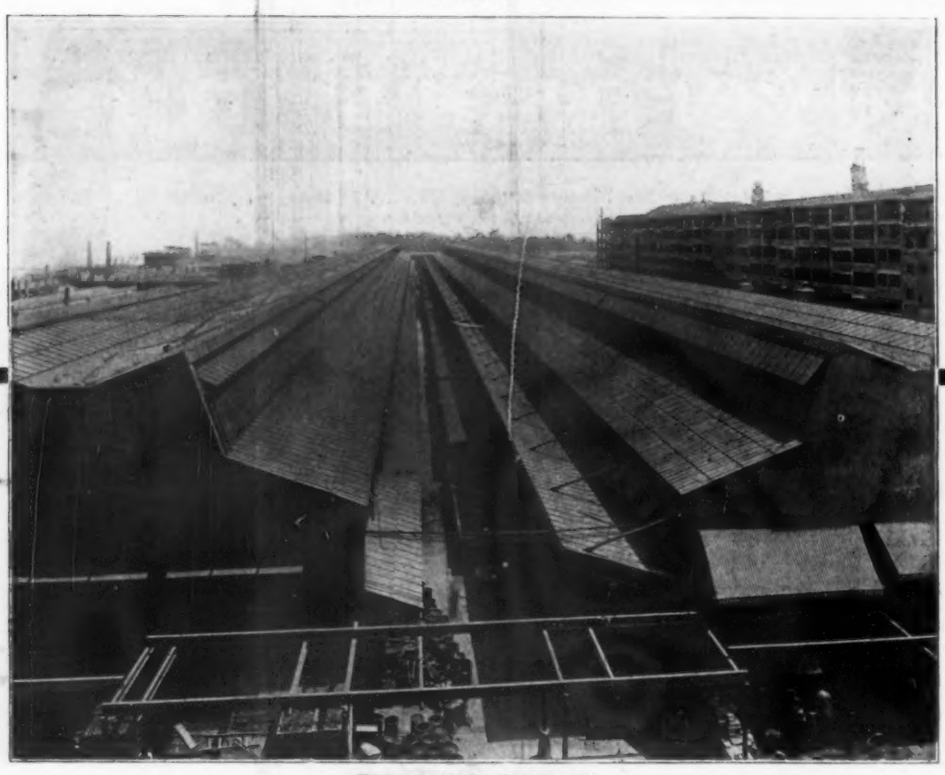
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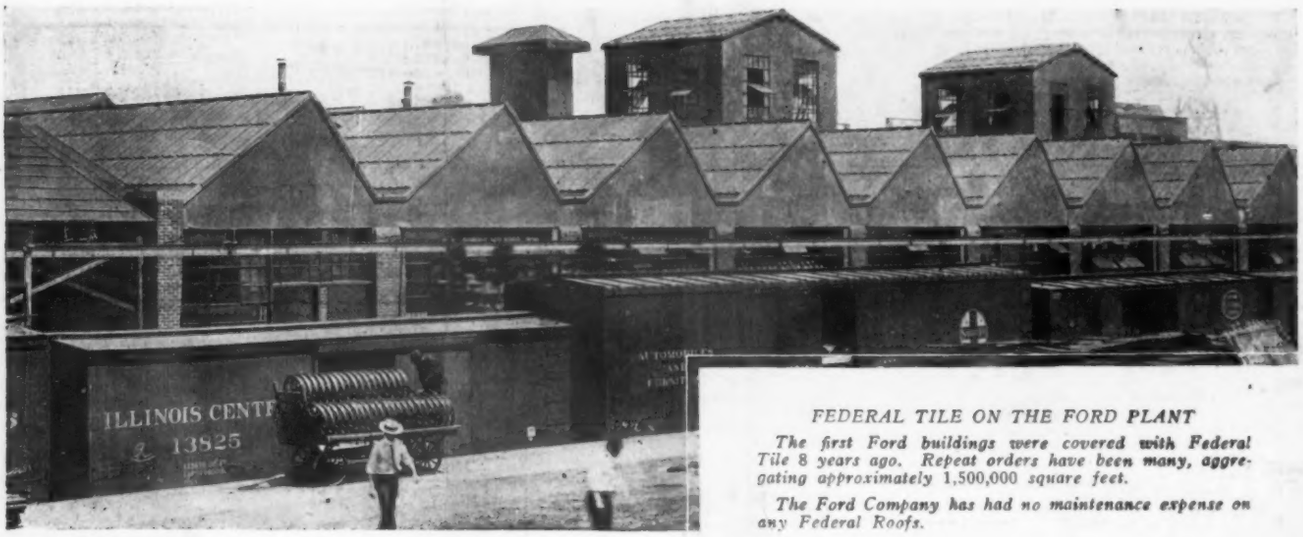
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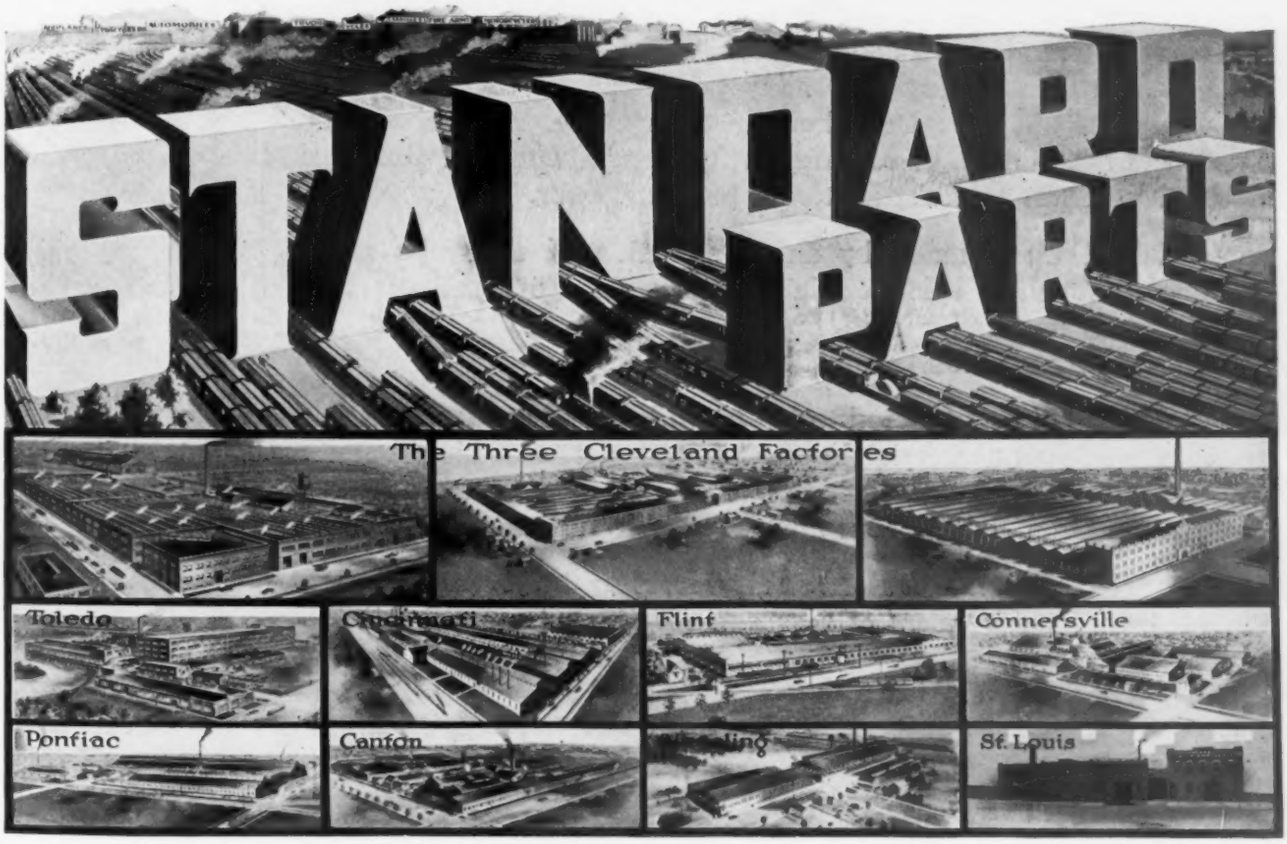
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